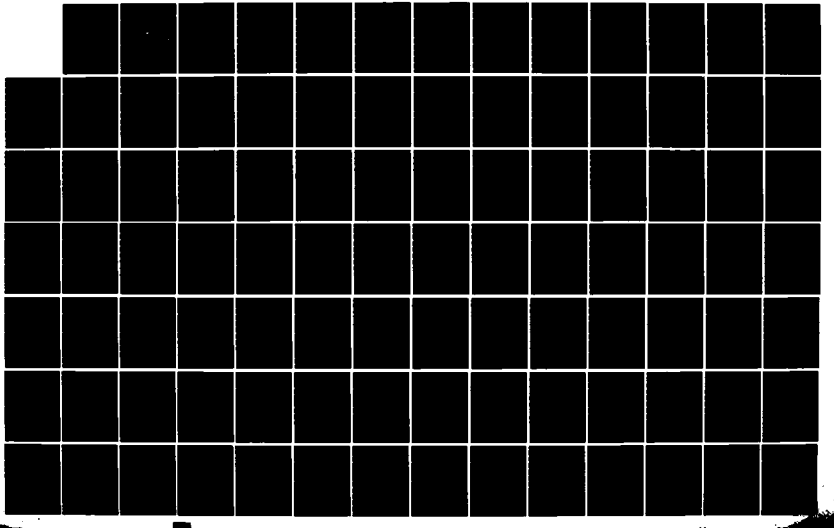
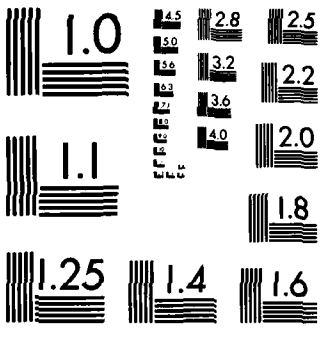
AD-A155 162 A LOGICAL DESIGN OF THE NAVAL POSTGRADUATE SCHOOL HOUSING OFFICE(U) NAVAL POSTGRADUATE SCHOOL MONTEREY CA A W CALDER MAR 85 1/2

UNCLASSIFIED F/G 5/1 NL





NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

A LOGICAL DESIGN OF THE
NAVAL POSTGRADUATE SCHOOL HOUSING OFFICE

by

Alexander W. Calder

March 1985

Thesis Advisor: Barry A. Frew

Approved for public release; distribution is unlimited

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A155162	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* A Logical Design of the Naval Postgraduate School Housing Office		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis March 1985
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Alexander W. Calder		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, CA 93493		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, CA 93943		12. REPORT DATE March 1985
		13. NUMBER OF PAGES 100
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*		15. SECURITY CLASS. *(of this report)* UNCLASSIFIED
		15a. DECLASSIFICATION/ DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution is unlimited

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Logical Design, La Mesa Housing Office, Structural Analysis, Housing Office

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Navy Housing activities have been automating internal administrative functions through the purchase of office automation equipment. This thesis provides a comprehensive study and logical design of the facilities management branch of a housing activity utilizing the La Mesa Housing Project as a model.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

S N 0102-LF-014-6601

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

Approved for public release; distribution is unlimited.

A Logical Design
of
The Naval Postgraduate School Housing Office

by

Alexander W. Calder
Lieutenant, United States Navy
B.S., Youngstown State University, 1977

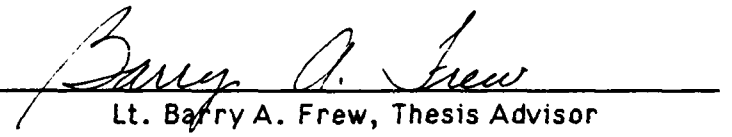
Submitted in partial fulfillment of the
Requirements for the degree of

MASTER OF SCIENCE IN INFORMATION SYSTEMS

from the

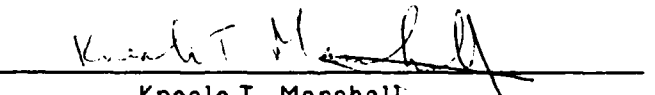
NAVAL POSTGRADUATE SCHOOL
March 1985

Author: 
Alexander W. Calder

Approved by: 
Lt. Barry A. Frew, Thesis Advisor

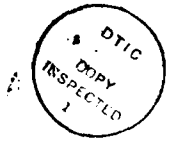

Daniel R. Dolk, Second Reader


Willis R. Greer Jr., Chairman,
Department of Administrative Sciences


Kneale T. Marshall,
Dean of Information and Policy Sciences

ABSTRACT

Navy Housing activities have been automating internal administrative functions through the purchase of office automation equipment. This thesis provides a comprehensive study and logical design of the facilities management branch of a housing activity utilizing the La Mesa Housing Project as a model.



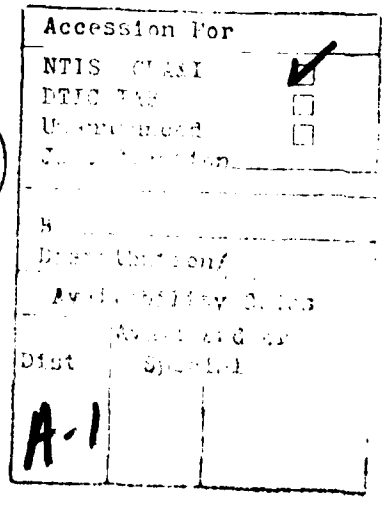


TABLE OF CONTENTS

LIST OF FIGURES

I. NAVY HOUSING FUNCTIONS

A. BACKGROUND INFORMATION

1. Thesis Background

In July of 1984, the La Mesa Housing Project of the Naval Postgraduate School received a Wang Office Information System model 60 (Wang OIS-60). This system was purchased because of a NAVFAC directive that housing activities should pursue automation of internal operations to increase productivity. Prior to its installation, a discussion with Charles Pooler, Assistant Housing Manager, indicated that a requirements analysis of the housing activity could be useful to allow for the full utilization of the new system.

This thesis is a conceptual study of the logical functions provided by the Facilities Management Branch of the La Mesa Housing Project. The study is documented at a high level, that is, it does not address control of functions or the implementation details. Functions are identified and explained utilizing a structured analysis technique. This involves decomposition of the major functions which are then organized hierarchically. The narrative function definitions describe that function and the next lower level of detail, but this level of detail is not graphically depicted. A data flow diagram shows the flow of data between the lowest level functions. Required data is then identified in a data dictionary and depicted graphically to show functional utilization of this data. External interfaces identify those data flows where the information

exits from the system. The data usage charts show high level input data needed for each function, and what the output will be. Finally, the data relationship charts show graphically what entities, in turn, require some data from another entity. The conclusion then discusses the view of the system based on this study.

2. The Navy Housing Program

Since 1782, Congress has been authorizing housing for members of the U.S. Armed Forces. 1866 saw the recognition of members' families needs; World War I brought about quarters allowance to enlisted personnel. World War II resulted in a huge buildup of housing units, but most were substandard or temporary in nature. After World War II, however, the impetus for ongoing steadily funded housing for military personnel was recognized. Various programs have come and gone since then and today there are approximately 400,000 units in the DoD housing inventory. Of these, approximately 70,000 units are in the Navy inventory.

The program manager for the Navy Family Housing Program is Commander, Naval Facilities Engineering (COMNAVFACENGCOM). This office provides centralized guidance and coordination for all the management aspects of family housing. The five Engineering Field Divisions (EFD) represent COMNAVFACENGCOM to provide closer liaison, more accessible management and technical guidance to the individual housing activities. These EFD's are located in Honolulu, San Francisco, Philadelphia, Norfolk, and Charleston. Figure 1 demonstrates the resource and policy flow.

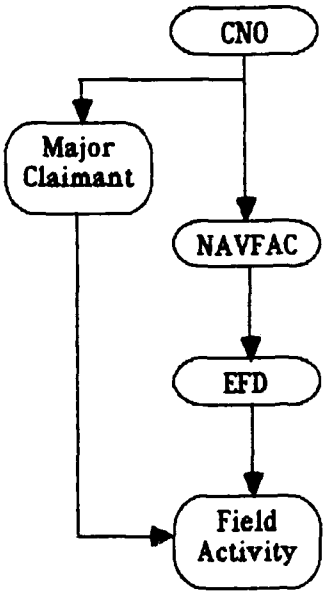


Figure 1
Policy Flow in Navy Housing

The divisional organization of NAVFACENGCOM encompasses all aspects of that responsibility to maintain policy continuity and enforcement. The housing division of the Facilities Management Department is responsible for promulgating NAVFAC policy on housing to the individual activities in its zone of control. The housing division internal organization is shown in Figure 2.

Personnel Support Branch	Facilities Management Branch
* Housing Referral	* Financial Management
* HUD Programs	* Maintenance Management
* Assignments	* Projects
* Requirements	* Occupancy Inspections
* Leasing	* Conservation
* Acquisition & Disposal	* Community Support Facilities
* Inventory & Utilization	* Furnishings
* Collections	* Occupant Relations

Figure 2
Housing Activity Internal Organization

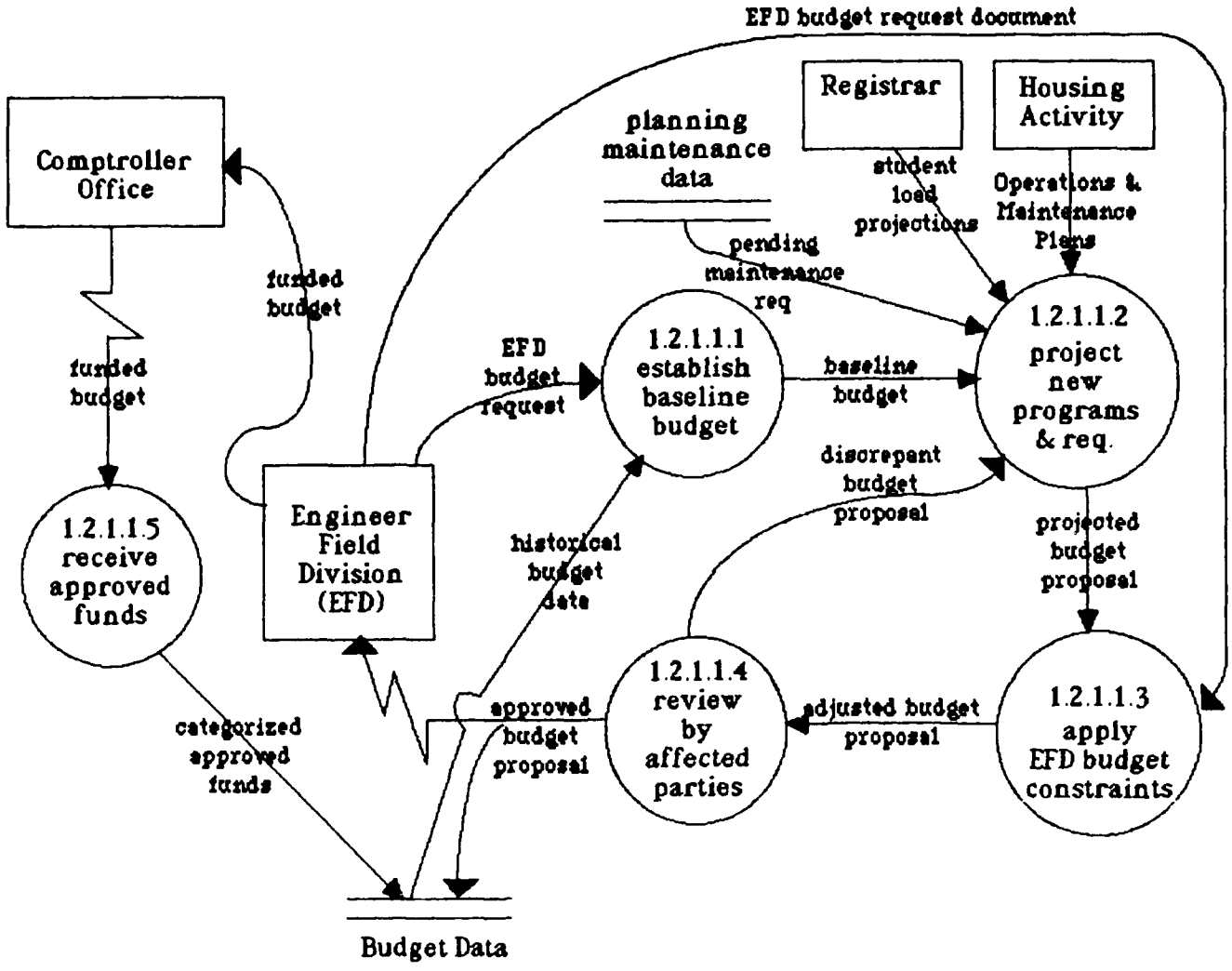


Figure 8
Prepare Budget Data Flow Diagram

against projected requirements. Discrepancies are recorded for the housing activity's reevaluation. The adjusted budget proposal is approved and forwarded to the EFD.

	SOURCE/DESTINATION
INPUT: Adjusted Budget Proposal	Module 1.2.1.1.3
OUTPUT: Discrepant Budget Proposal	Module 1.2.1.1.2
Approved Budget Proposal	Budget Data Engineering Field Division

****

NAME: RECEIVE APPROVED FUNDS

IDENTIFIER: 1.2.1.1.5

DESCRIPTION: This function receives the funded amounts that have been allocated to the activity and initiates the budget execution function (1.2.1.2).

	SOURCE/DESTINATION
INPUT: Funded Budget	Comptroller Office
OUTPUT: Categorized Approved Funds	Budget Data

areas needing greater or lesser funding are then documented. The budget proposal is formalized and the future requirements for funding to meet the operations and maintenance plan are added to each budget element of the budget proposal.

		SOURCE/DESTINATION
INPUT:	Baseline Budget	Module 1.2.1.1.1
	Operations Plan	Housing Office
	Maintenance Plan	Housing Office
	Discrepant Budget Proposal	Module 1.2.1.1.4
	Pending Maintenance Requests	Planning Maintenance Data
	Student Load Projections	Registrar
OUTPUT:	Projected Budget Proposal	Module1.2.1.1.3

****

NAME: APPLY EFD BUDGET CONSTRAINTS

IDENTIFIER: 1.2.1.1.3

DESCRIPTION: This function applies constraints as listed in the EFD Budget Request Document to the projected budget proposal. Illustative of this function is the application of the approved inflation factor and the reevaluation of projected needs due to ceiling limitations of specific budget elements. The function produces an adjusted budget proposal.

		SOURCE/DESTINATION
INPUT:	Projected Budget Proposal	Module 1.2.1.1.2
	EFD Budget Request Document	Engineering Field Division
OUTPUT:	Adjusted Budget Proposal	Module 1.2.1.1.4

****

NAME: REVIEW BY AFFECTED PARTIES

IDENTIFIER: 1.2.1.1.4

DESCRIPTION: This function is an evaluation of the budget proposal by functional areas outside the housing activity which are affected by this proposal. The request is evaluated for proper submission and incorporated into base budget data. Budgeted amounts are validated against the services to be performed. Adequate funds are allocated

D. OPERATE ACTIVITY FUNCTIONAL DECOMPOSITION

1. Prepare Budget Functions Decomposition

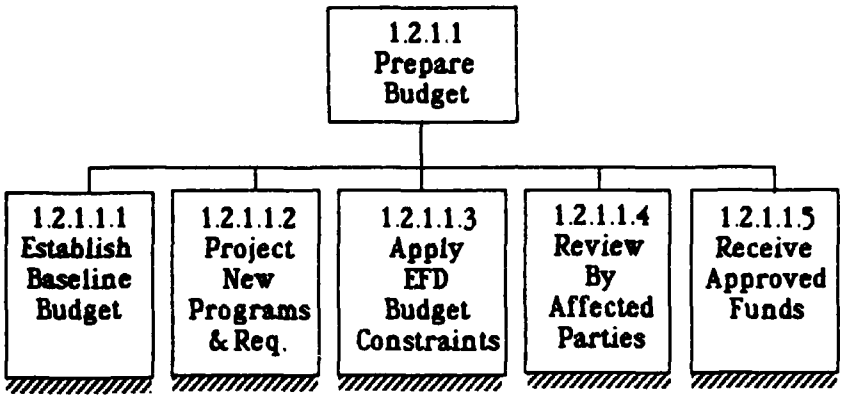


Figure 7
Prepare Budget Structure Chart

****

NAME: ESTABLISH BASELINE BUDGET

IDENTIFIER: 1.2.1.1.1

DESCRIPTION: This function evaluates past fiduciary needs and performance to establish a baseline for budget preparation. A baseline budget is produced from this data.

	SOURCE/DESTINATION
INPUT: Engineering Field Division Budget Request	Engineering Field Division
Historical Budget Data	Budget Data
OUTPUT: Baseline Budget	Module 1.2.1.1.2

****

NAME: PROJECT NEW PROGRAMS AND REQUIREMENTS

IDENTIFIER: 1.2.1.1.2

DESCRIPTION: This function utilizes the operations and maintenance plans to ascertain the future fiduciary needs for each budget element. Those

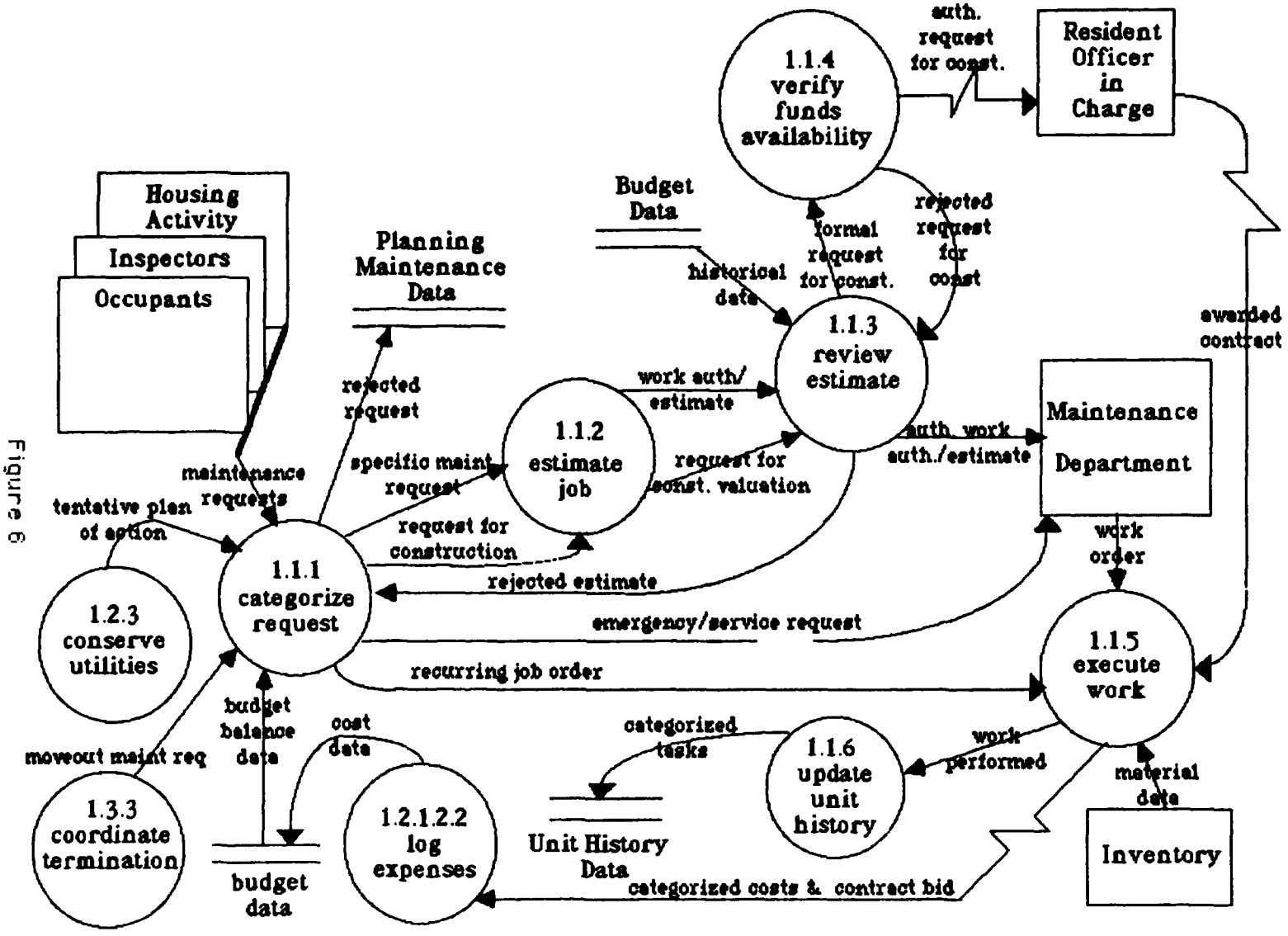


Figure 6
Maintain Activity Data Flow Diagram

****

NAME: UPDATE UNIT HISTORY

IDENTIFIER: 1.1.6

DESCRIPTION: This function evaluates the work completed by task category. The task is then entered by category to the appropriate record that updates Unit History data.

	SOURCE/DESTINATION
INPUT: Work Performed	Module 1.1.5
OUTPUT: Categorized Tasks	Unit History Data

****

NAME: VERIFY FUNDS AVAILABILITY

IDENTIFIER: 1.1.4

DESCRIPTION: This function verifies that funds are not over-obligated. The RFC cost is compared to the recorded balance of budgeted dollars remaining. The RFC is then authorized or rejected, depending on this comparison.

		SOURCE/DESTINATION
INPUT:	Formal Request for Const.	Module 1.1.3
OUTPUT:	Authorized Request for Const.	Resident Officer in Charge
	Rejected Request for Const.	Module 1.1.3

****

NAME: EXECUTE WORK

IDENTIFIER: 1.1.5

DESCRIPTION: This function completes the required work based on the input information. The appropriate quantity and type of resources for task accomplishment are expended, bounded by the written estimates. As the work is performed, the appropriate expenditures are maintained.

		SOURCE/DESTINATION
INPUT:	Work Order	Maintenance Department
	Awarded Contract	Resident Officer-in-Charge
	Recurring Job Order	Module 1.1.1
	Material Data	Inventory
OUTPUT:	Categorized Costs	Module 1.2.1.2.2
	Contract Bid	Module 1.2.1.2.2

Specific Maintenance Request	Module 1.1.2
Request for Construction(RFC)	Module 1.1.2
Emergency/Service Request	Maintenance Shop
Recurring Job Order	Module 1.1.5

****

NAME: ESTIMATE JOB

IDENTIFIER: 1.1.2

DESCRIPTION: This function establishes an estimate of the RFC or specific maintenance requests based on expert knowledge. The skill level required for the request is evaluated, manhours required are estimated, and overall cost for materials is annotated on the request.

		SOURCE/DESTINATION
INPUT:	Request for Construction(RFC)	Module 1.1.1
	Specific Maintenance Request	Module 1.1.1
OUTPUT:	Work Auth./Estimate (specific)	Module 1.1.3
	Request for Const. Valuation	Module 1.1.3

****

NAME: REVIEW ESTIMATE

IDENTIFIER: 1.1.3

DESCRIPTION: This function compares the work estimate to known data on funds availability, job priority, and the valuation of the request. A decision is then made as to whether the maintenance will be executed. The estimate is approved and forwarded, or rejected.

		SOURCE/DESTINATION
INPUT:	Work Auth./Estimate	Module 1.1.2
	Request for Const. Valuation	Module 1.1.2
	Historical Budget Data	Budget Data
OUTPUT:	Formal Request for Const.	Module 1.1.4
	Authorized Work Auth./Estimate	Maintenance Department
	Rejected Estimate	Module 1.1.1

C. MAINTAIN ACTIVITY FUNCTIONAL DECOMPOSITION

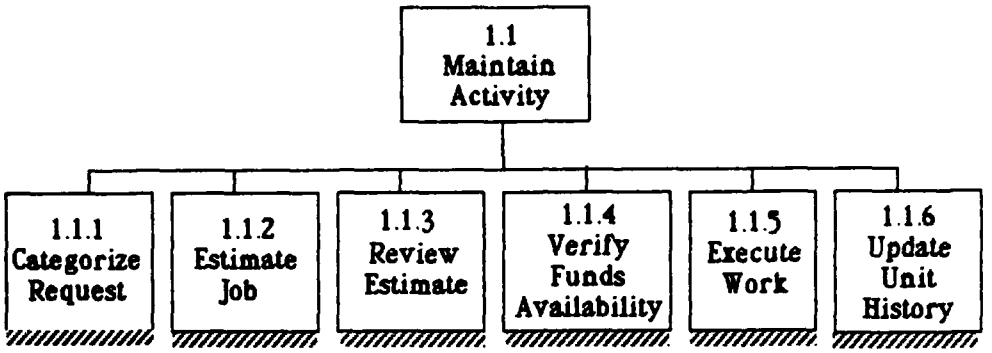


Figure 5
Maintain Activity Structure Chart

****

NAME: CATEGORIZE REQUEST

IDENTIFIER: 1.1.1

DESCRIPTION: This function evaluates all requests for feasibility, number of man-hours required, the approximate overall cost, and the priority of work execution. This is accomplished by comparison to past similar jobs. The function assigns a category of work as emergency/service (routine), recurring, or specific (non-routine). If the request is large in scope or beyond the local maintenance capabilities, a fourth category, request for construction, is assigned. Appropriate paperwork is then completed and forwarded. Estimates of any past processed requests are re-evaluated to determine if the request can be changed to make it acceptable or to place it into the planning maintenance data for future consideration.

	SOURCE/DESTINATION
INPUT: Maintenance Requests	Housing Activity Inspectors Occupants
Rejected Estimate	Module 1.1.3
Budget Balance Data	Budget Data
Moveout Maintenance Requirement	Module 1.3.3.5
Tentative Plan of Action	Module 1.2.3.4
OUTPUT: Rejected Request	Planning Maintenance Data

****

NAME: OPERATE ACTIVITY

IDENTIFIER: 1.2

DESCRIPTION: This function maintains the budget, sustains all operational supplies, conserves utilities, and sustains the furnishings inventory. The inventory duties include both tracking and maintaining adequate numbers of inventory items.

****

NAME: HANDLE OCCUPANT NEEDS

IDENTIFIER: 1.3

DESCRIPTION: This function identifies the interractions of the housing office with those persons who request assignment to, are assigned to, or request termination from the housing activity.

B. HIGH LEVEL FUNCTIONAL DECOMPOSITION

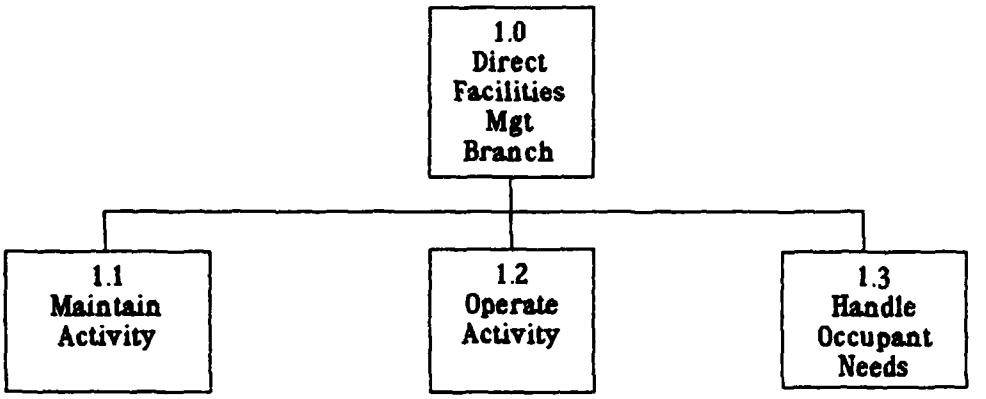


Figure 4
High Level Structure Chart

****

NAME: DIRECT FACILITIES MANAGEMENT BRANCH

IDENTIFIER: 1.0

DESCRIPTION: This function maintains all facilities assigned to the activity, operates the activity, and handles occupant needs.

****

NAME: MAINTAIN ACTIVITY

IDENTIFIER: 1.1

DESCRIPTION: This function plans, programs, budgets,and executes the activity's maintenance program. This includes all upkeep, repair and replacement of any facility or item assigned to the activity.

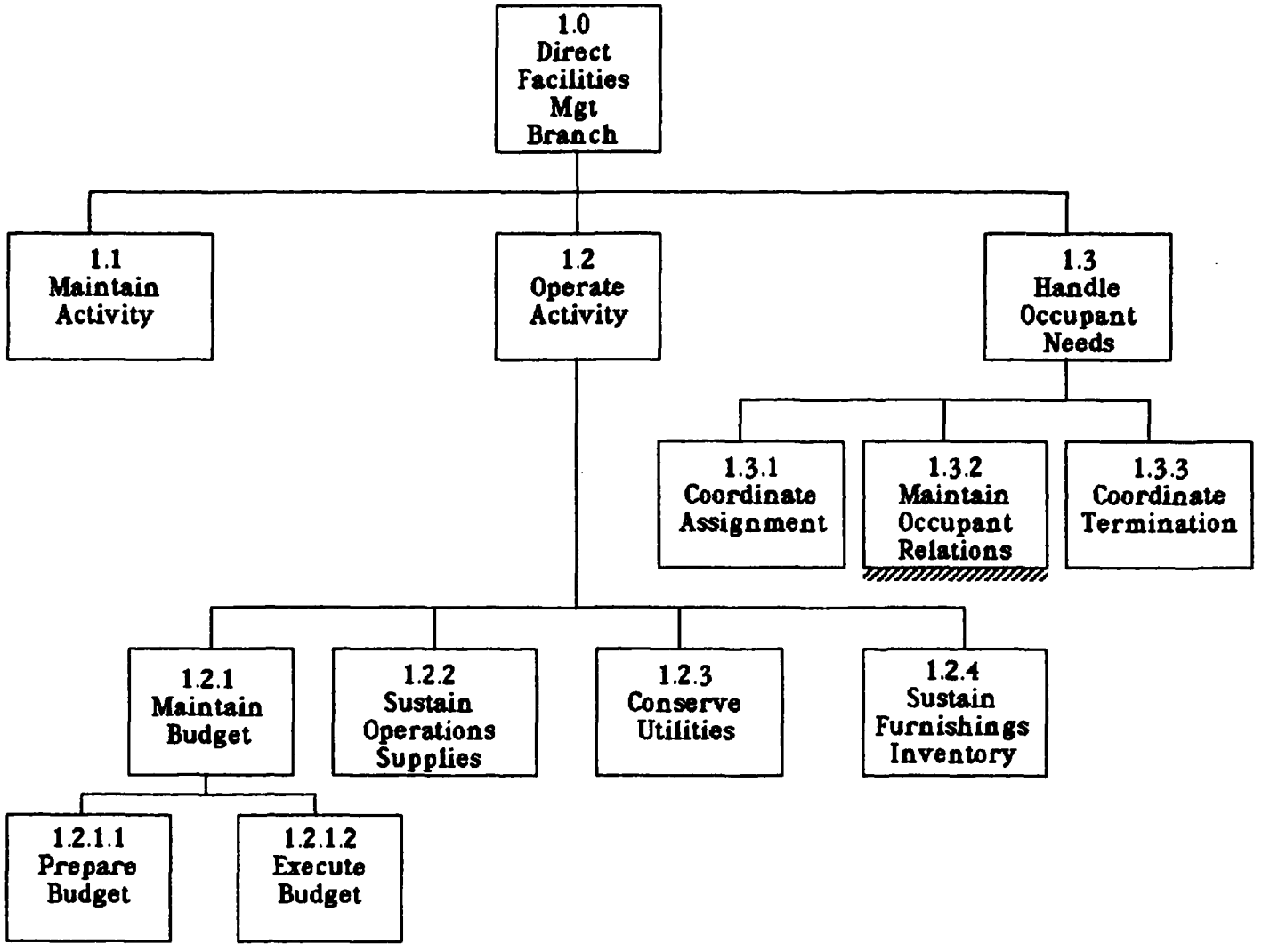


Figure 3
Housing Activity Hierarchical Function Chart

and automated systems in place have not been presented in this logical model. An attempt to name functions and processes consistently and accurately has been made to help the reader better understand the system. To aid in function definition and to validate a particular level, the next lower level of functions are described. The function description consists of a name, a unique identifier, a descriptive narrative, and the inputs and outputs that are required.

The functional description format is a structure chart of the function including the next lowest level, a narrative description, and (for the lowest level functions only) a data flow diagram.

The following descriptions are for high level functions. Because each high level function is subsequently broken into lower level functions, the descriptions are broad. Lower level functions will be described in more detail.

This organization of management functions is identical to those at the field activity. This standardized organization structure has been implemented to provide an optimum level of service and to enhance inter-and-intra-staff effectiveness. Those items under the Personnel Support Branch deal with satisfying housing requirements while those under the Facilities Management Branch deal with maintaining property and equipment, operating the activity in an effective and efficient manner, and responding to occupant needs.

The Facilities Management Branch, although divided into eight organizational areas, can be functionally divided into three areas: maintenance, operations, and occupant relations. Figure 3 is a hierarchical functional chart for the facilities management branch.

The La Mesa Housing Project, Naval Postgraduate School, began operation in 1951 in conjunction with the purchase of the Del Monte Hotel which was obtained as a new campus for the Naval Postgraduate School. The housing project began with the purchase of 14 housing units located on the grounds of the hotel. In 1951 Congress approved funding for the acquisition of an additional 449 housing units to support the school's student body. From 1961 through 1969 an additional 428 units were added to the housing project. Today the La Mesa Project encompasses 891 housing units on 300 acres, serves 1500 service members, and requires a $3.5 million dollar annual budget. This housing activity is the source of information for this thesis.

Each of the major functions will be hierarchically decomposed into subfunctions and described in more detail. Current organizational structure

2. Execute Budget Functions Decomposition

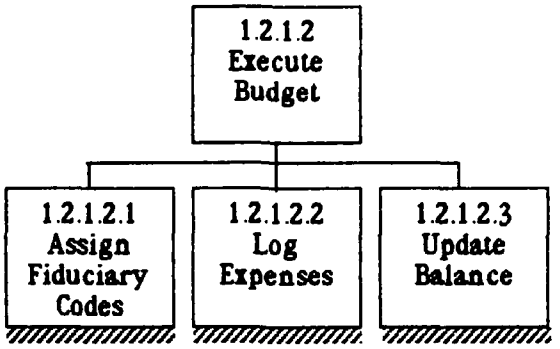


Figure 9
Execute Budget Structure Chart

****

NAME: ASSIGN FIDUCIARY CODES

IDENTIFIER: 1.2.1.2.1

DESCRIPTION: This function evaluates the cost source, assigns the cost originator data, and assigns a unique Original Document Code to the cost. The accounting data is noted on the document.

	SOURCE/DESTINATION
INPUT: Labor and Material Costs	Maintenance Shop
Requisition	Supply Department
Bid	Contractors
Bill	Utility Companies
Budget Balance	Budget Data
OUTPUT: Notated/Categorized Cost	Module 1.2.1.2.2

****

NAME: LOG EXPENSES

IDENTIFIER: 1.2.1.2.2

DESCRIPTION: This function takes the data and logs it into the budget data in accepted accounting format and methodology.

	SOURCE/DESTINATION
INPUT: Notated/Categorized Cost	Module 1.2.1.2.1
OUTPUT: Categorized Cost Data	Budget Data

****

NAME: UPDATE BALANCE

IDENTIFIER: 1.2.1.2.3

DESCRIPTION: This function debits funds from the appropriate funds category. The balance is figured and recorded. This balance for the cost category is continually monitored to ensure that sufficient funds are maintained. Any unusual circumstances affecting funds such as funds cuts or reprogramming are accomplished. Costs are aggregated for reporting puposes.

	SOURCE/DESTINATION
INPUT: Budget Data	Budget Data
OUTPUT: Manipulated Budget Data	Comptroller Budget Data

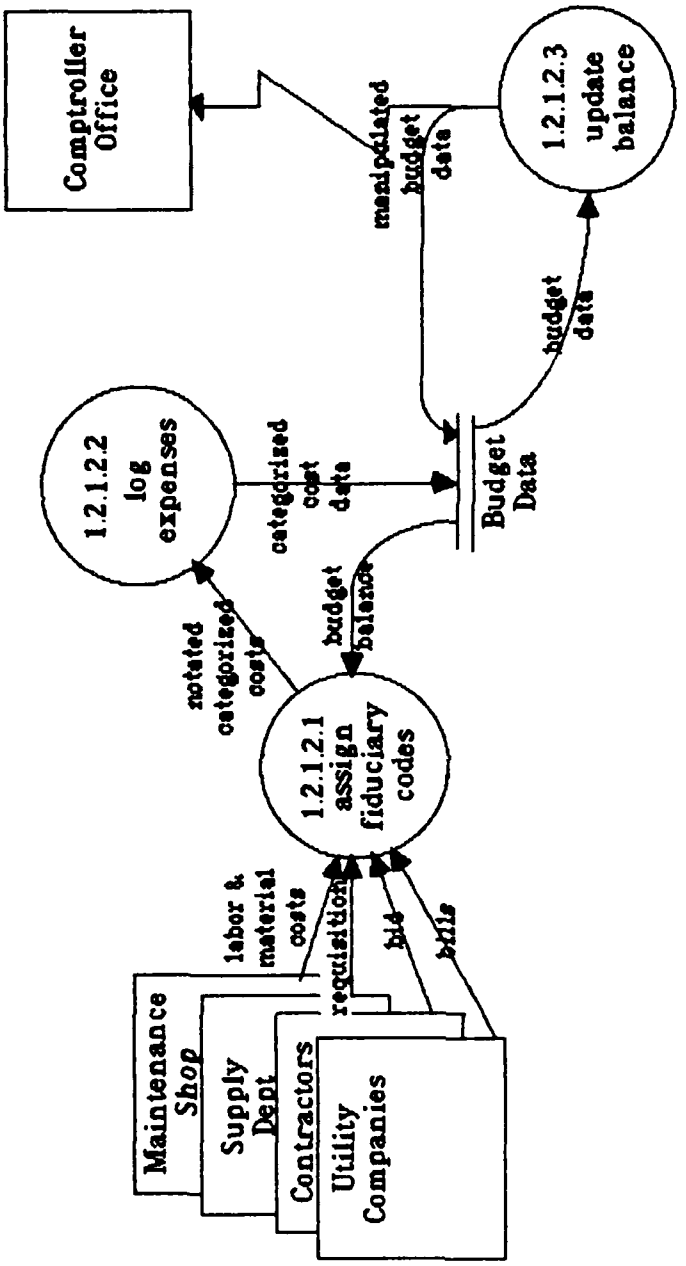


Figure 10
Execute Budget Data Flow Diagram

3. Sustain Operations Supplies Functions Decomposition

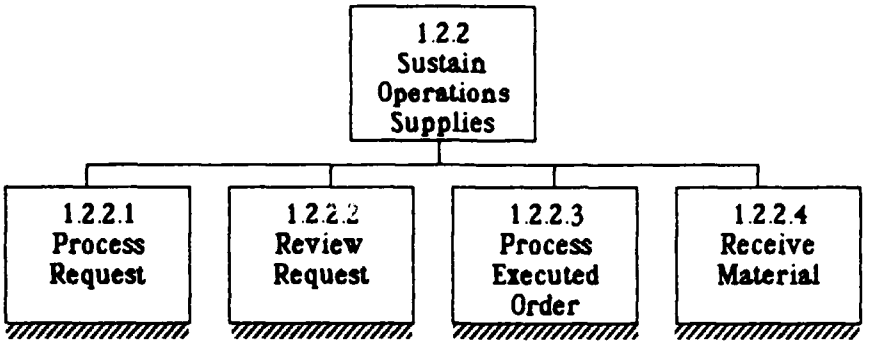


Figure 11
Sustain Operations Supplies Structure Chart

****

NAME: PROCESS REQUEST

IDENTIFIER: 1.2.2.1

DESCRIPTION: This function evaluates the housing activity material request to determine the appropriate source from which to fulfill the request. Documentation is prepared for the internal material requisition order (Ready Supply). Documentation is prepared for the external material requisition order.

		SOURCE/DESTINATION
INPUT:	Material Request	Housing Activity
	Inventory Request	Module 1.2.4.2
OUTPUT:	Internal Material Requisition Order	Module 1.2.2.4
	External Material Requisition Order	Module 1.2.2.2

****

NAME: REVIEW REQUEST

IDENTIFIER: 1.2.2.2

DESCRIPTION: This function categorizes the material requisition order by accounting data (budget project, budget line code) and then evaluates the cost(s) of the requested material to ascertain the funds status of the requested item(s). A determination as to rejection or acceptance of the request is then made.

	SOURCE/DESTINATION
INPUT: External Material Requisition Order	Module 1.2.2.1
OUTPUT: Approved Material Requisition Order	Supply Department
Rejected Material Requisition Order	Housing Activity

****

NAME: PROCESS EXECUTED ORDER

IDENTIFIER: 1.2.2.3

DESCRIPTION: This function evaluates the cost(s) of the requested material as noted on the order in process. Variations in cost, quantity, or type of material are noted.

	SOURCE/DESTINATION
INPUT: Order in Process	Supply Department
OUTPUT: Cost Obligations	Module 1.2.1.2.2

****

NAME: RECEIVE MATERIAL

IDENTIFIER: 1.2.2.4

DESCRIPTION: This function performs the physical receipt of the ordered materials. Receipt paperwork is validated against actual receipt and

the inventory records are updated. Those parties that ordered the material are notified. Internal ordered supplies are received directly.

	SOURCE/DESTINATION
INPUT: Material Receipt Notification	Supply Department
Internal Material Requisition Order	Module 1.2.2.1
OUTPUT: Material	Inventory Warehouse
Internal Material Requisition Order Cost(s)	Module 1.2.1.2.2

Figure 12
Sustain Operations Supplies Data Flow Diagram

4. Conserve Utilities Functions Decomposition

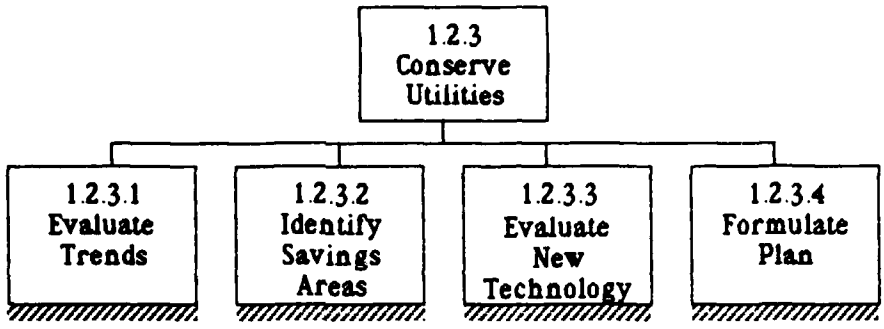


Figure 13
Conserve Utilities Structure Chart

****

NAME: EVALUATE TRENDS

IDENTIFIER: 1.2.3.1

DESCRIPTION: This function aggregates historical utilities costs and performs statistical consumption trend analysis.

	SOURCE/DESTINATION
INPUT: Historical Utility Data	Budget Data
OUTPUT: Statistical Trend Data	Module 1.2.3.2

****

NAME: IDENTIFY SAVINGS AREAS

IDENTIFIER: 1.2.3.2

DESCRIPTION: This function examines Naval Facilities Command policies, utility company surveys and the statistical trend data to find those areas not in keeping with accepted consumption policies. The Property Account and Unit History Data is studied for trends of age, inadequacies, or failure that may be a factor in unsatisfactory utility consumption.

		SOURCE/DESTINATION
INPUT:	Statistical Trend Data	Module 1.2.3.1
	Unit Data	Unit History Data
	Utility Surveys	Utility Companies
	Policies	Naval Facilities Command
OUTPUT:	Specific Categories for Savings	Module 1.2.3.3

****

NAME: EVALUATE NEW TECHNOLOGY

IDENTIFIER: 1.2.3.3

DESCRIPTION: This function evaluates the scope of the identified category for savings. Research is conducted on the industry literature to determine possible new technologies or methods for saving. Approximate estimates are established and program scope is decided.

		SOURCE/DESTINATION
INPUT:	Specific Categories for Savings	Module 1.2.3.2
	New Technology Data	Industry Literature
OUTPUT:	Savings Requirement Solutions	Module 1.2.3.4

****

NAME: FORMULATE PLAN

IDENTIFIER: 1.2.3.4

DESCRIPTION: This function estimates the initial cost for the solution. Cost benefit studies are undertaken. A priority is assigned to project and the plan enters the Maintain Activity (1.1) interface.

		SOURCE/DESTINATION
INPUT:	Savings Requirement Solutions	Module 1.2.3.3
OUTPUT:	Tentative Plan Of Action	Module 1.1

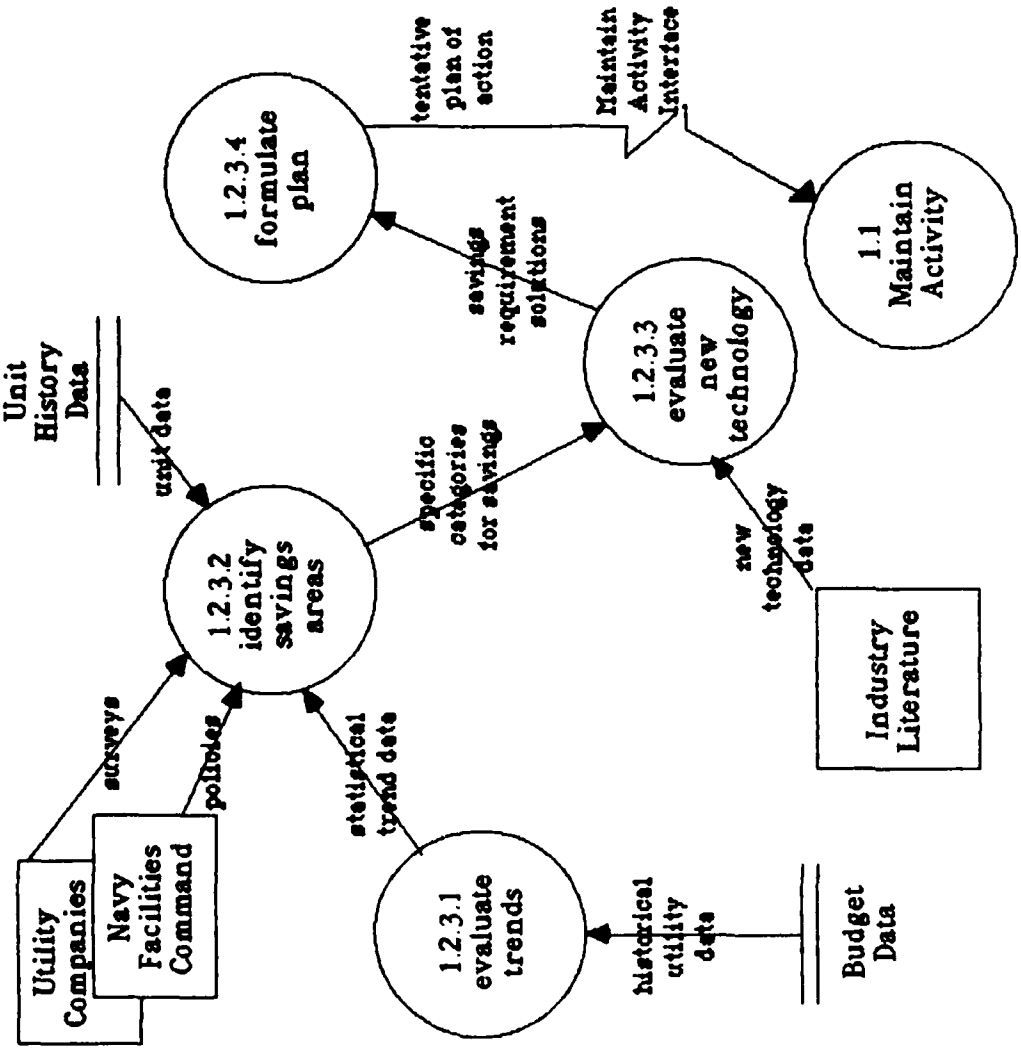


Figure 14
Conserve Utilities Data Flow Diagram

5. Sustain Furnishings Functions Decomposition

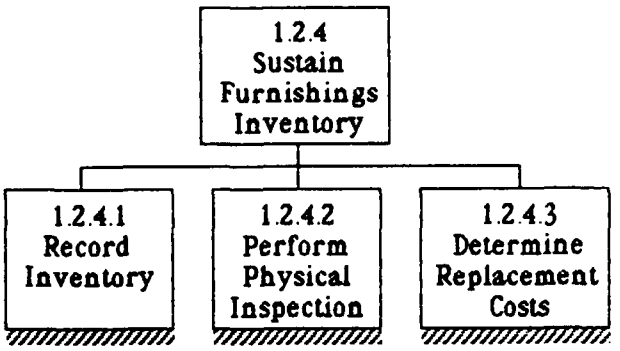


Figure 15
Sustain Furnishings Inventory Structure Chart

****

NAME: RECORD INVENTORY

IDENTIFIER: 1.2.4.1

DESCRIPTION: This function evaluates past orders to aggregate like items. The inventory for the warehouse is checked against this aggregate. Past maintenance requirements utilizing the inventory are taken from the budget data and integrated into this list. The final product is the recorded inventory.

	SOURCE/DESTINATION
INPUT: Quantitative Data	Warehouse
	Units
Unit Data	Unit History File
Budget Data	Budget Data
OUTPUT: Recorded Inventory	Module 1.2.4.2

****

NAME: PERFORM PHYSICAL INSPECTION

IDENTIFIER: 1.2.4.2

DESCRIPTION: This function performs an on-site physical inspection of warehouse inventory and vacant units to evaluate accuracy of the inventory record. Discrepancies are noted for further action . A verified inventory is then written. Short supplies of consummables are noted and a supply request will be initiated.

		SOURCE/DESTINATION
INPUT:	Recorded Inventory	Module 1.2.4.1
OUTPUT:	Internal Supply Request	Module 1.2.2
	Verified Inventory	Module 1.2.4.3

****

NAME: DETERMINE REPLACEMENT COSTS

IDENTIFIER: 1.2.4.3

DESCRIPTION: This function differentiates items that are replaceable versus consummable. An example would be a stove versus paper products. The present year replacement value is researched and noted for each item and total worth. Shortfalls in inventory are noted for replacables and a supply request is issued. Future replacement is projected and these needs are communicated to the Housing Office.

		SOURCE/DESTINATION
INPUT:	Verified Inventory	Module 1.2.4.2
	Accepted Replacement Values	GAO
OUTPUT:	Inventory Replacement Data	Housing Activity
	External Supply Request	Module 1.2.2
	Inventory Value/Quantities	Public Works Inventory

Figure 16
Sustain Furnishings Inventory Data Flow Diagram

E. HANDLE OCCUPANTS NEEDS FUNCTIONAL DECOMPOSITION

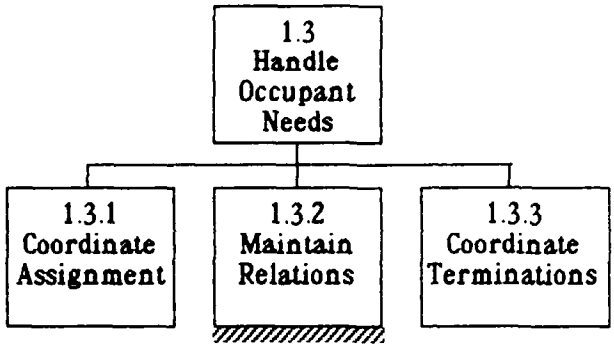


Figure 17
Handle Occupant Needs Structure Chart

****

NAME: COORDINATE ASSIGNMENT

IDENTIFIER: 1.3.1

DESCRIPTION: This function processes personnel information required to allow potential assignment to family housing. Eligibility is determined and a position on an appropriate waiting list is assigned. Once an appropriate unit becomes available for accupancy, it will be offered for member inspection. If a member rejects two consecutive selections, he is removed from the list and must reapply for housing. If either unit is chosen, the unit is assigned to that member and upon move-in, a check-in inspection will be held to mutually ascertain the condition of the unit at move-in.

****

NAME: MAINTAIN OCCUPANT RELATIONS

IDENTIFIER: 1.3.2

DESCRIPTION: Occupant relations programs are designed to promote an amicable atmosphere among occupants and a close relationship between the occupants and the housing organization. The activity maintains and is responsible to make each occupant aware of local regulations and situations. This module incorporates intangibles such as an orientation plan, "town hall" meetings and other communication vehicles between the activity and its occupants. This area will not be

****
Element name : Address
Format : alphanumeric
Size : 50
Description : The address the Housing Availability Form DD 1747 is to be sent upon receipt of the application for housing.
****
Element name : Rank/Rate
Format : alphanumeric
Size : 6
Description : The military rank of officer members or the military rate of enlisted members applying or residing at the housing activity.
****
Element name : Social security number
Format : numeric
Size : 9
Description : The unique, Federally assigned Social security number of the member.
****
Element name : Date of rank
Format : numeric
Size : 6 (MMDDYY)
Description : The date when the member is considered for promotion.
****
Element name : Effective date of change in duty station
Format : numeric
Size : 6 (MMDDYY)
Description : The estimated date the member will depart his last permanent duty station.
****
Element name : Total number in family
Format : numeric
Size : 2
Description : The total number of dependents, not including the member.
****
Element name : Spouse
Format : alphabetic
Size : 3
Description : An indicator as to the marital status.
****
Element name : Date of birth, male children
Format : numeric
Size : 6 (MMDDYY)
Description : The birthdates of male children to reside with the member.

First name	
Middle initial	
Address	
Rank/Rate	
Social security number	SSN
Date of rank	
Effective date of change of duty station	Rotation date,Detachment date
Total number in family	
Spouse	Wife,Husband
Date of Birth, male children	
Date of birth, female children	
Other dependents, number	
Other dependents, sex	
Other dependents, relationship	
Other dependents, ages	
Other dependents, dependency authority	
Not-on-waiting list explanation	
Temporary telephone number	
Telephone number	
Date of assignment	
Projected rotation date	PRD
Pre-termination date	
Termination date	
Next permanent duty station	
Signature	

****
Element name : Installation name
Format : alphanumeric
Size : 25
Description : The installation to which the member is being assigned.
****
Element name : Last name
Format : alphabetic
Size : 15
Description : The legal last name of the member.
****
Element name : First name
Format : alphabetic
Size : 15
Description : The legal first name of the member.
****
Element name : Middle initial
Format : alphabetic
Size : 2
Description : The middle initial(s) of the member.

II. HOUSING ACTIVITY FACILITIES MANAGEMENT BRANCH DATA DICTIONARY

This section defines the data utilized by the Housing Office. The purpose of a data dictionary is to form a central repository of data about data used in the system. The data dictionary format that follows will consist of the entity name followed by a description. Below it will be a list of elements describing that entity and to the right of the element, any aliases that may apply to the element. Each entity will then be addressed individually to include, as applicable:

Element Name : (full and proper name)

Format : (alphabetic, mixed, or numeric)

Size : (normal character length)

Description : (brief discussion of what the element is).

The entities are Member, Application, Waiting List, Inventory, Unit, Maintenance, Requisition, and Funds.

A. MEMBER ENTITY

****

Entity name : Member

Aliases : Applicant, Occupant

Description : A person who submits an application for housing, presently resides in a housing activity facility, or is in the process of terminating his or her commitment to the housing activity.

Elements :	Aliases :
Installation name	Duty station, Parent Command
Last name	

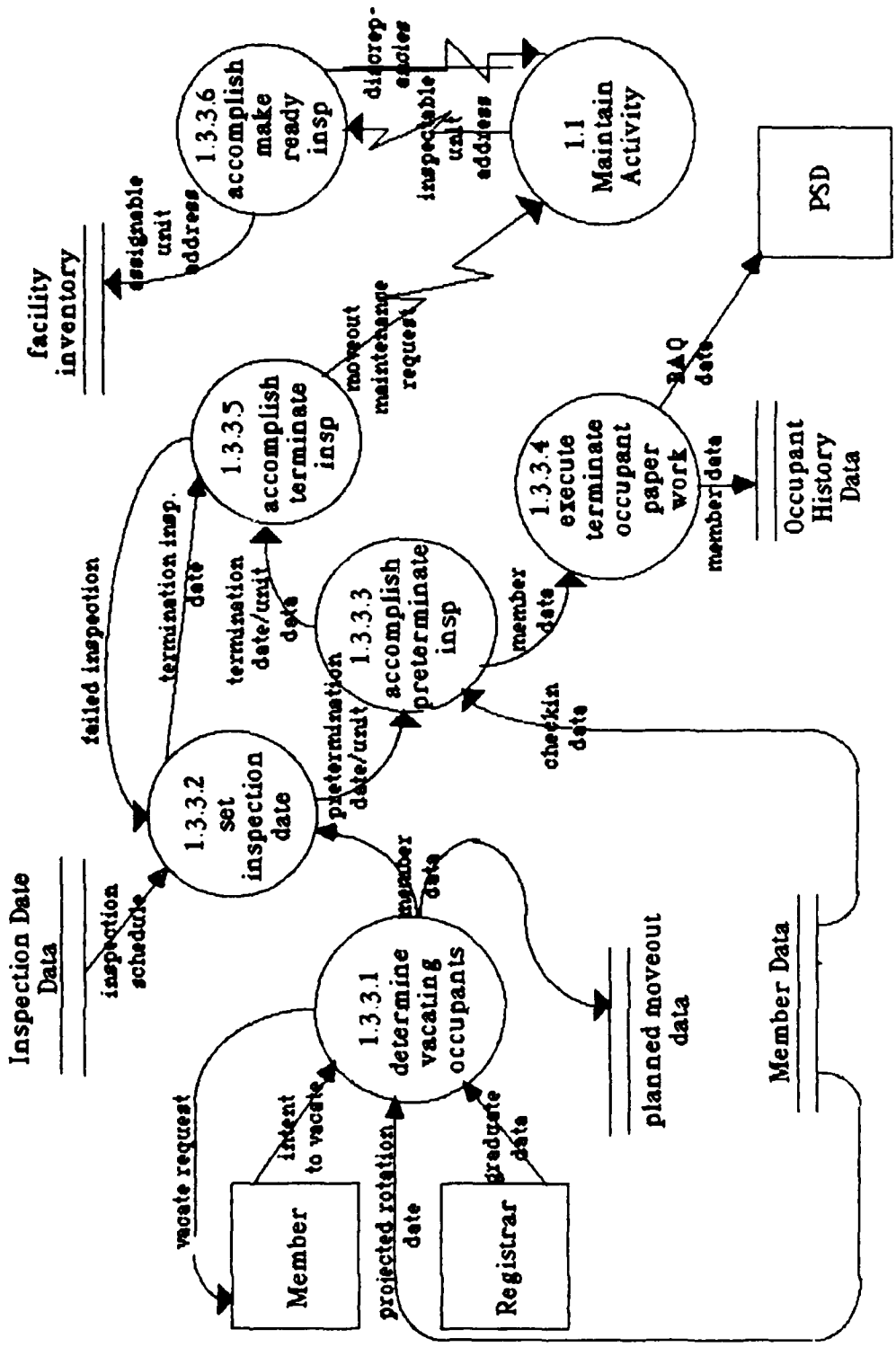


Figure 21
Coordinate Termination Data Flow Diagram

****

NAME: ACCOMPLISH MAKE-READY INSPECTION

IDENTIFIER: 1.3.3.6

DESCRIPTION: This function evaluates on-site condition after maintenance to ensure completion and to inspect overall condition. Once satisfactory, the unit is released for assignment.

		SOURCE/DESTINATION
INPUT:	Inspectable Unit Address	Module 1.1
OUTPUT:	Assignable Unit Address	Facility Inventory
	Discrepancies	Module 1.1

****

NAME: EXECUTE TERMINATE OCCUPANT PAPERWORK

IDENTIFIER: 1.3.3.4

DESCRIPTION: This function executes reinstatement of BAQ based on date of detachment. The occupant data is removed from active occupant data. Member data is moved to occupant history data.

	SOURCE/DESTINATION
INPUT: Member Data	Module 1.3.3.3
OUTPUT: BAQ Data	PSD
Member Data	Occupant History Data

****

NAME: ACCOMPLISH TERMINATION INSPECTION

IDENTIFIER: 1.3.3.5

DESCRIPTION: This function accomplishes the termination inspection after all personal effects have been removed. State of cleanliness, discrepancy rectification as noted in the pre-termination inspection, and moveout maintenance requirements are noted. If found acceptable, the member is released from any further responsibility to the housing activity. If not, the member must reschedule another termination inspection date after the discrepancies are rectified.

	SOURCE/DESTINATION
INPUT: Unit Data	Module 1.3.3.3
Termination Inspection Date	Module 1.3.3.2
	Module 1.3.3.3
OUTPUT: Moveout Maintenance Request	Module 1.1

****

NAME: SET INSPECTION DATE

IDENTIFIER: 1.3.3.2

DESCRIPTION: This function evaluates the pre-termination dates available and assigns one that is mutually satisfactory to the occupant and the housing inspectors.

		SOURCE/DESTINATION
INPUT:	Inspection Schedule	Inspection Date Data
	Member Data	Module 1.3.3.1
	Failed Inspection	Module 1.3.3.5
OUTPUT:	Pre-termination Inspection Date/ Unit	Module 1.3.3.3
	Termination Inspection Date	Module 1.3.3.5

****

NAME: ACCOMPLISH PRE-TERMINATION INSPECTION

IDENTIFIER: 1.3.3.3

DESCRIPTION: This function accomplishes an on-site inspection of the unit with the member. Discrepancies between unit condition at move-out and condition at the check-in inspection are recorded. Evaluate the unit for move-out maintenance requirements and set a termination inspection date.

		SOURCE/DESTINATION
INPUT:	Pre-termination Inspection Date	Module 1.3.3.2
	Check-in Data	Member Data
	Unit	Module 1.3.3.2
OUTPUT:	Termination Inspection Date	Module 1.3.3.5
	Unit data	Module 1.3.3.5
	Member Data	Module 1.3.3.4

2. Coordinate Termination Functions Decomposition

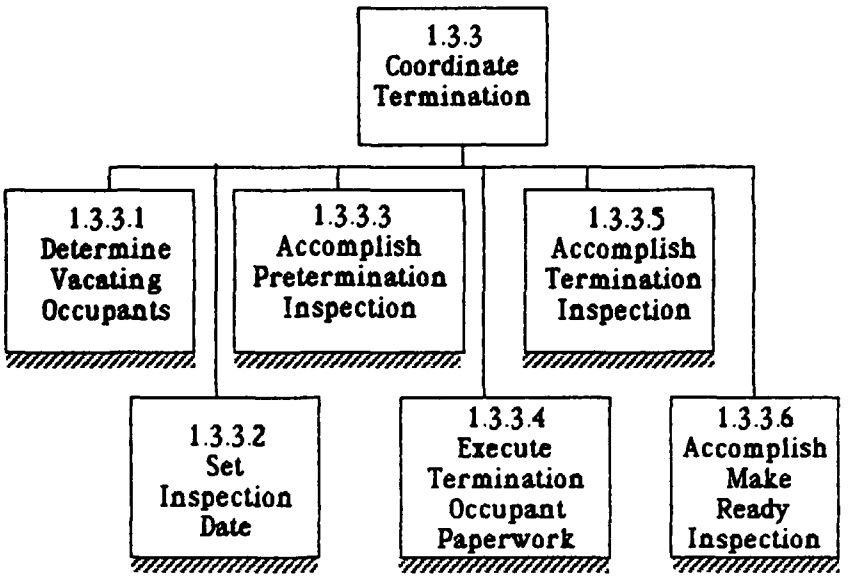


Figure 20
Coordinate Termination Structure Chart

****

NAME: DETERMINE VACATING OCCUPANTS

IDENTIFIER: 1.3.3.1

DESCRIPTION: This function evaluates the intent to vacate forms submitted and cross references the graduating class roster sent to the activity by the registrar. Records are inspected to validate occupants that will be leaving the command within a minimum of 30 days. Enter all validated occupant/unit information into planned moveout data.

		SOURCE/DESTINATION
INPUT:	Intent to Vacate	Member
	Graduate Data	Registrar
	Projected Rotation Date	Member Data
OUTPUT:	Member Data	Module 1.3.3.2 Planned Moveout Data
	Vacate Request	Member

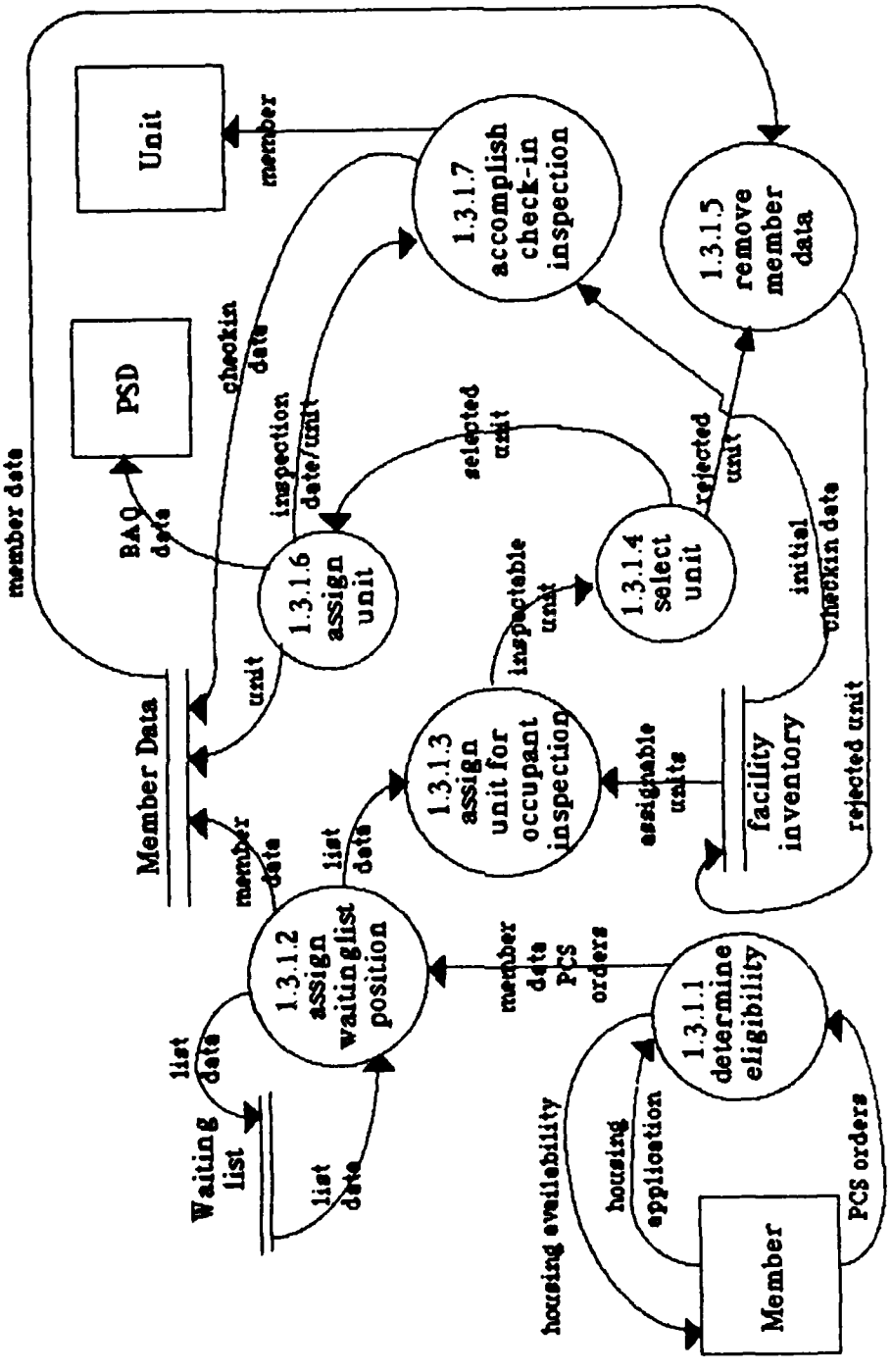


Figure 19
Coordinate Assignment Data Flow Diagram

****

NAME: ACCOMPLISH CHECK-IN INSPECTION

IDENTIFIER: 1.3.1.7

DESCRIPTION: This function accomplishes an inspection with the member to record the condition of the unit, verify unit inventory, condition, operation and identification numbers of the unit inventory. The member is informed of all rules and regulations pertaining to occupancy.

		SOURCE/DESTINATION
INPUT:	Inspection Date/Unit	Module 1.3.1.5
	Initial Check-in Data	Facility Inventory
OUTPUT:	Check-in Data	Member Data

the unit(s). The activity will either assign the unit to the member or remove the person from the waiting list and from the occupant data.

	SOURCE/DESTINATION
INPUT: Inspectable Unit	Module 1.3.1.3
OUTPUT: Selected Unit	Module 1.3.1.6
Rejected Unit	Module 1.3.1.5

****

NAME: REMOVE MEMBER DATA

IDENTIFIER: 1.3.1.5

DESCRIPTION: Upon notification of two rejections, the member's data is removed from the occupant data, and removed from the appropriate waiting list. The rejected units are released for reassignment.

	SOURCE/DESTINATION
INPUT: Rejected Unit	Module 1.3.1.4
Member Data	Member Data
OUTPUT: Rejected Unit	Facility Inventory

****

NAME: ASSIGN UNIT

IDENTIFIER: 1.3.1.6

DESCRIPTION: This function assigns a unit to the member. Keys and rules are issued. BAQ termination papers are processed effective the day of assignment. A check-in inspection date is assigned.

	SOURCE/DESTINATION
INPUT: Selected Unit	Module 1.3.1.4
OUTPUT: BAQ Data	Personnel Support Det.
Inspection Date/Unit	Module 1.3.1.7
Unit	Member Data

****

NAME: ASSIGN WAITING LIST POSITION

IDENTIFIER: 1.3.1.2

DESCRIPTION: This function determines the position on the waiting list according to date of detachment. The member data is entered on the appropriate waiting list and a personnel file is opened for the member.

		SOURCE/DESTINATION
INPUT:	Member Data	Module 1.3.1.1
	PCS Orders	Module 1.3.1.1
	List Data	Waiting List
OUTPUT:	Member Data	Member Data Module 1.3.1.3
	List Data	Waiting List

****

NAME: ASSIGN UNIT FOR OCCUPANT INSPECTION

IDENTIFIER: 1.3.1.3

DESCRIPTION: This function matches assignable units with eligible members on an appropriate waiting list. The top-positioned member is notified and a date and address for inspection is determined.

		SOURCE/DESTINATION
INPUT:	Assignable Units	Facility Inventory
	List Data	Module 1.3.1.2
OUTPUT:	Inspectable Unit	Module 1.3.1.4

****

NAME: SELECT UNIT

IDENTIFIER: 1.3.1.4

DESCRIPTION: The member evaluates the offered unit(s) to determine suitability. He then notifies housing of his decision to accept or reject

1. Coordinate Assignment Functions Decomposition

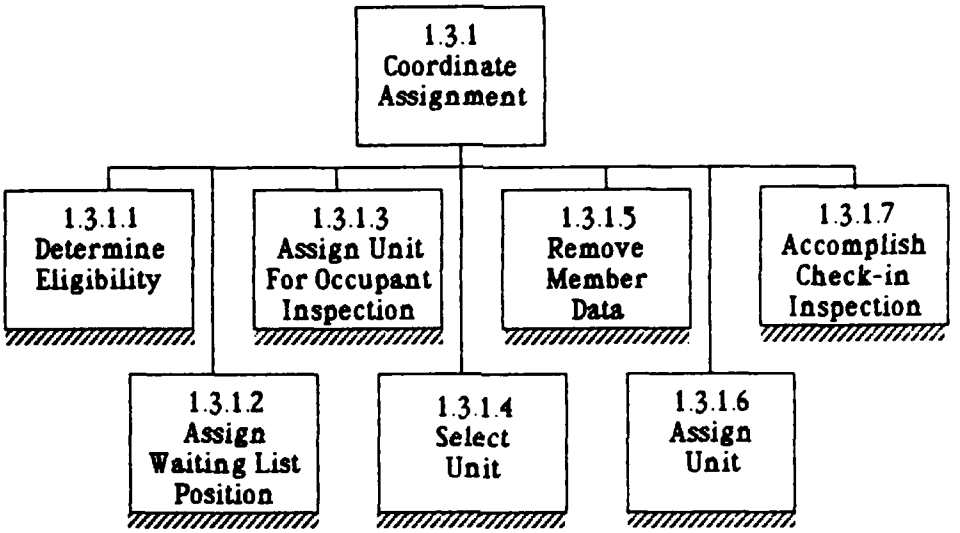


Figure 18
Coordinate Assignment Structure Chart

****

NAME: DETERMINE ELIGIBILITY

IDENTIFIER: 1.3.1.1

DESCRIPTION: This function evaluates the housing application for completeness. It is validated with appropriate personnel data to ensure the person is being ordered to a tenant activity under the activity's responsibility. A determination of quarters size and location eligibility is determined by family size and rank. A status of housing availability is then given to the applicant.

		SOURCE/DESTINATION
INPUT:	Housing Application	Member
	PCS Orders	Member
OUTPUT:	Housing Availability	Member
	Member Data	Module 1.3.1.2
	PCS Orders	Module 1.3.1.2

studied further because of its unstructured, human interactionary nature.

****

NAME: COORDINATE TERMINATION

IDENTIFIER: 1.3.3

DESCRIPTION: This function categorizes those occupants who desire or are required to move out. Upon determining vacating occupants, a pre-termination date is assigned. On the appointed date an inspection of the unit is perfomed. Termination paperwork is completed and after the occupant's personal effects have been removed, a termination inspection is completed. Maintenance requirements are sent through the maintenance management function and when completed, a make-ready inspection is performed. The unit is then released for assignment.

****
Element name : Date of birth, female children
Format : numeric
Size : 6 (MMDDYY)
Description : The birthdates of female children to reside with the member.
****
Element name : Other dependents number
Format : numeric
Size : 2
Description : The total number of other dependents falling into the same category of the next two elements (Other dependents sex and relationship) considered together.
****
Element name : Other dependents sex
Format : alphabetic
Size : 6
Description : The sex of other dependents.
****
Element name : Other dependents ages
Format : numeric
Size : 3
Description : The age of other dependents.
****
Element name : Other dependents dependency authority
Format : numeric
Size : 6 (MMDDYY)
Description : he date of approval of other dependents (found on the application for dependent identification cards, DD Form 137).
****
Element name : Not-on-waiting list explanation
Format : alphabetic
Size : 50
Description : The reasons and circumstances as to why the member is not on a waiting list.
****
Element name : Temporary telephone number
Format : numeric
Size : 10
Description : The telephone number the member can be reached at when a unit becomes available for inspection.
****
Element name : Telephone number
Format : numeric
Size : 11
Description : The telephone number of the member's home phone number.

****
Element name : Date of assignment
Format : numeric
Size : 6 (MMDDYY)
Description : The effective date of assignment when the member takes responsibility of that unit.

****
Element name : Projected rotation date
Format : numeric
Size : 6
Description : The date the individual is scheduled to leave the tenant command (installation name).

****
Element name : Pre-termination inspection date
Format : numeric
Size : 6 (MMDDYY)
Description : The assigned date at which time an inspector will inspect the unit with the member prior to moving out.

****
Element name : Termination inspection date
Format : numeric
Size : 6 (MMDDYY)
Description : The date the member will conduct a unit inspection with an inspector after personal affects have been moved out.

****
Element name : Next permanent duty station
Format : alphanumeric
Size : 50
Description : The address where the member can be reached after termination has been completed.

****
Element name : Signature
Format : alphabetic
Size : 25
Description : The full member name, in handwritten form, required for validating any requests.

B. APPLICATION ENTITY

****
Entity name : Application

Aliases : DD Form 1746

Description : The form required to be submitted in order to be considered for housing assignment.

Elements : Aliases :

Date submitted
Date/time application received
Effective date of application
Date housing availability form sent

****
Element name : Date submitted
Format : numeric
Size : 6 (MMDDYY)
Description : The date the application for housing assignment was sent to the activity by the member.
****
Element name : Date/time application received
Format : numeric
Size : 10 (MMDDYY,time)
Description : The date and time the application is processed for application to housing.
****
Element name : Effective date of application
Format : numeric
Size : 6 (MMDDYY)
Description : The actual departure from the member's last duty station.
****
Element name : Date housing availability form sent
Format : numeric
Size : 6 (MMDDYY)
Description : The date the housing availability form is sent in reponse to the member's application for housing.

C. WAITING LIST ENTITY

****
Entity name : Waiting list

Aliases :

Description : A list of members that are eligible for the same type of unit.

Elements : Aliases :

Grade classification
Number of bedrooms
Housing availability
Effective date and time

****
Element name : Grade classification
Format : alphabetic
Size : 6
Description : The type of units the list is compiled for by the date of rank seniority (junior, field, or senior officer).
****
Element name : Number of bedrooms
Format : numeric
Size : 1
Description : The number of bedrooms the list is compiled for.
****
Element name : Housing availability
Format : alphanumeric
Size : 8
Description : The statements indicated as valid on the housing availability form sent to the member.
****
Element name : Effective date and time
Format : numeric
Size : 10 (MMDDYY,time)
Description : The day the member arrives at the housing office.

D. INVENTORY ENTITY

****
Entity name : Inventory

Aliases : Furnishings, Property

Description : The classification and categorization of all property that housing is held responsible for.

Elements :	Aliases :
Location	
Quantity	
Item name	
Item model number	
Item serial number	
Item date installed	
Item date last inventoried	
Bench stock nomenclature	Bench Stock, Consumables
National stock number	NSN
Unit of Issue	

****
Element name : Location
Format : alphanumeric
Size : 15
Description : The identifying location of the inventory item.
****
Element name : Quantity
Format : numeric
Size : 3
Description : The number of items at that location.
****
Element name : Item name
Format : alphabetic
Size : 10
Description : The name of the item.
****
Element name : Item model number
Format : alphanumeric
Size : 10
Description : The model number of the item.

****
Element name : Item serial number
Format : alphanumeric
Size : 12
Description : The serial number assigned to the item.
****
Element name : Item date installed
Format : numeric
Size : 6 (MMDDYY)
Description : The date the item was installed/received.
****
Element name : Date item last inventoried
Format : numeric
Size : 6 (MMDDYY)
Description : The date the item was last inventoried.
****
Element name : Bench stock nomenclature
Format : alphabetic
Size : 20
Description : The name of an inventory item that is considered a consumable item to be used in the repair of something. An example is furnace filters or drain cleaner.
****
Element name : National stock number
Format : alphanumeric
Size : 15
Description : The GSA assigned number that identifies the item.
****
Element name : Unit of Issue
Format : alphanumeric
Size : 8
Description : The unit of issue appropriate for the Inventory accounting, such as 1 each, case, box(es).

E. UNIT ENTITY

****
Entity name : Unit

Aliases :

Description : The classification and categorization of all units that housing is held responsible for.

Elements : Aliases :

Street address
Building number
Building type
Number of bedrooms
Square feet
Number of bathrooms
Carport
Fireplace
Project
Lockset
Fences
Ham radio
Gas dryer

****
Element name : Street address
Format : alphanumeric
Size : 15
Description : The unique identifying mailing address of each unit.
****
Element name : Building Number
Format : numeric
Size : 4
Description : The number assigned to the entire structure of which the unit is a part.
****
Element name : Building type
Format : alphanumeric
Size : 6
Description : Indicates the type of floorplan.
****
Element name : Number of bedrooms
Format : numeric
Size : 1
Description : Indicates the number of bedrooms of that unit.

****
Element name : Square feet
Format : numeric
Size : 4
Description : Indicates the total square footage available at that unit.
****
Element name : Number of bathrooms
Format : numeric
Size : 2
Description : Indicates the number of bathrooms available at that unit.
****
Element name : Carport
Format : alphanumeric
Size : 5
Description : Indicates the presence, absence and location of a carport at that address.
****
Element name : Fireplace
Format : alphabetic
Size : 3
Description : Indicates the presence or absence of a fireplace at that address.
****
Element name : Project
Format : alphabetic
Size : 10
Description : An indicator of when the unit was built.
****
Element name : Lockset number
Format : alphanumeric
Size : 10
Description : Indicates the unit lock serial number (found on the key).
****
Element name : Fences
Format : alphabetic
Size : 3
Description : Indicates approval for member fence installation.
****
Element name : Ham radio
Format : alphabetic
Size : 3
Description : Indicates if a unit is presently being inhabited by a member who requires specifc permission to structurally alter or to affix hobby equipment to the structure.

****
Element name : Gas Dryer
Format : alphabetic
Size : 3
Description : Indicates if a unit has an active gas line for a member's gas dryer.

F. MAINTENANCE ENTITY

****
Entity name : Maintenance

Aliases : Unit history

Description : The classification and categorization of all maintenance work done on any unit or inventory item of that unit.

Elements : Aliases :

Maintenance location
Maintenance type
Job order number
Start date
Completion date

****
Element name : Maintenance location
Format : alphanumeric
Size : 15
Description : The location of the maintenance action.
****
Element name : Maintenance type
Format : alphabetic
Size : 10
Description : A category of maintence for aggregation purposes. An example would be "roof leak" or "routine".
****
Element name : Job order number
Format : alphanumeric
Size : 6
Description : The control number against which all charges are made.
****
Element name : Start date
Format : numeric
Size : 6 (MMDDYY)
Description : The date the maintenance was started.
****
Element name : Completion date
Format : numeric
Size : 6 (MMDDYY)
Description : The date the maintenance was completed.

G. REQUISITION ENTITY

****
Entity name : Requisition

Aliases :

Description : The mechanism to log expenses or requests for obligation of funds.

Elements :	Aliases :
Original document code	ODC
Description	
Vendor	
Call number	
Basic job order number	Basic
Specific job order number	Specific
Labor hours	Labor
Job order number labor costs	
Contract number	
Request for contract number	RC number

****
Element name : Original document code
Format : numeric
Size : 8
Description : This is a unique identifying code assigned to all material or services requisition forms. Its purpose is to uniquely identify that particular document. Its format is as follows. The first digit is for fiscal year, the next three digits are for the receiving day's julian date, and the last four digits are sequential numbers assigned as the document is processed.

****
Element name : Description
Format : alphanumeric
Size : 30
Description : This is a narrative on what the requisition document is for.

****
Element name : Vendor
Format : alphabetic
Size : 15
Description : This is the name of the person or company supplying the service or material.

****
Element name : Call number
Format : numeric
Size : 4
Description : A code to track any purchases under a Blanket Purchase Authority.

****
Element name : Basic job order number
Format : alphanumeric
Size : 5
Description : This number indicates those budget line item costs less than 16 manhours or five hundred dollars, or both. It is used locally to accrue costs. Its format is as follows. The first letter is for type of funds, the second letter is for the cost originator, and the last three numbers indicate the budget project.

****
Element name : Specific job order number
Format : alphanumeric
Size : 5
Description : This number indicates those budget line item costs greater than 16 manhours or five hundred dollars, or both. It is used locally to accrue costs. It must necessarily have a controlled maintenance project associated with it. Its format is as follows. The first letter is for type of funds, the second letter is for the cost originator, and the last three numbers indicate the budget project.

****
Element name : labor hours
Format : numeric
Size : 5
Description : Those hours expended by the maintenance department, by job order number, under its budget line code.

****
Element name : Job order number labor costs
Format : numeric
Size : 7
Description : Those hours expended by the maintenance department, by job order number, in dollar amounts.

****
Element name : Contract number
Format : alphanumeric
Size : 9
Description : The identifying number assigned all contract maintenance or services that all costs are incurred against.

****
Element name : Request for contract number
Format : alphanumeric
Size : 10
Description : A number assigned to all contracts for the comptrollers use.

H. FUNDS ENTITY

****
Entity name : Funds

Aliases : Operations, Maintenance, or O & M Funds

Description : The classification and categorization of all funds for which Housing is held responsible. It is used to reimburse obligations incurred.

Elements :	Aliases :
Budget project	BP
Budget line code	BLC
Cost account code	CAC
Segment number	
Controlled maintenance project	CMP
Committed funds	Committed
Actual expense	Actual
Difference	
Balance	
Budget line code labor	BLC labor
Fiscal year budget line code request	FY BLC request
Fiscal year EFD BLC validattion	
Annual planning figure	APF

****
Element name : Budget project
Format : numeric
Size : 2
Description : This is a division of the Operations and Maintenance subaccount that categorically delineates exact totals of funds that can be obligated for a specific purpose only. The entire budget is divided into five separate "pots" of money and funds transfer between these is not authorized without higher approval. An example is Budget Project 20, used only for maintenance and repair.

****
Element name : Budget line code
Format : alphanumeric
Size : 4
Description : This code indicates a particular kind of expense within one budget project. It's format is as follows. The first letter indicates Operations funds (A) or Maintenance funds (B), the two numbers indicate a category and the last letter, a sub-category.

8. 1.3.3 Coordinate Termination Data Usage Chart

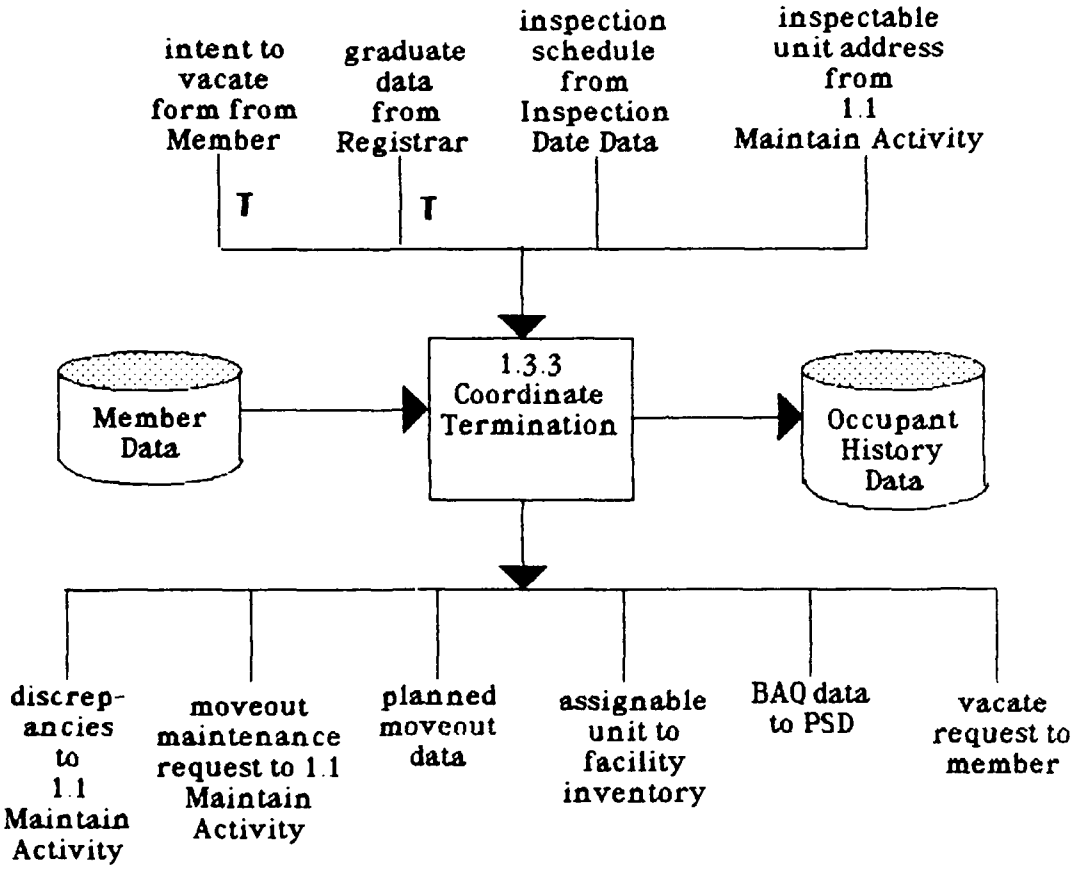


Figure 29
Coordinate Termination Data Usage Chart

7. 1.3.1 Coordinate Assignment Data Usage Chart

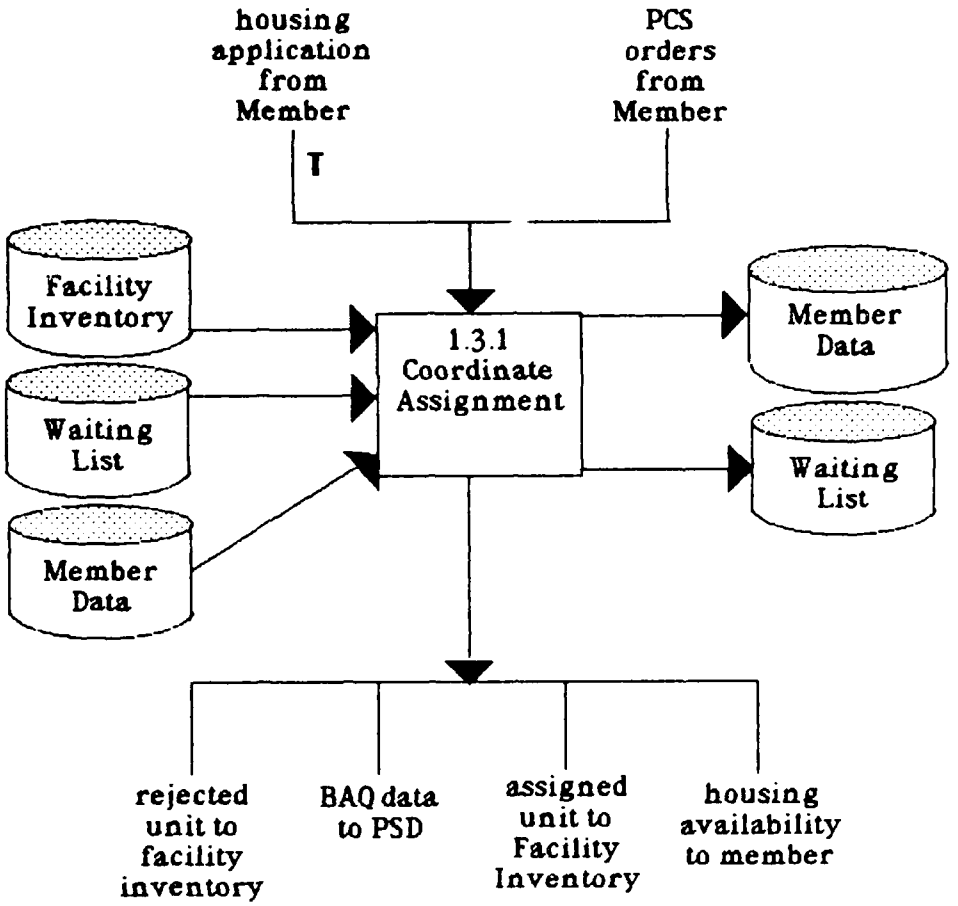


Figure 28
Coordinate Assignment Data Usage Chart

6. 1.2.4 Sustain Furnishings Inventory Data Usage Chart

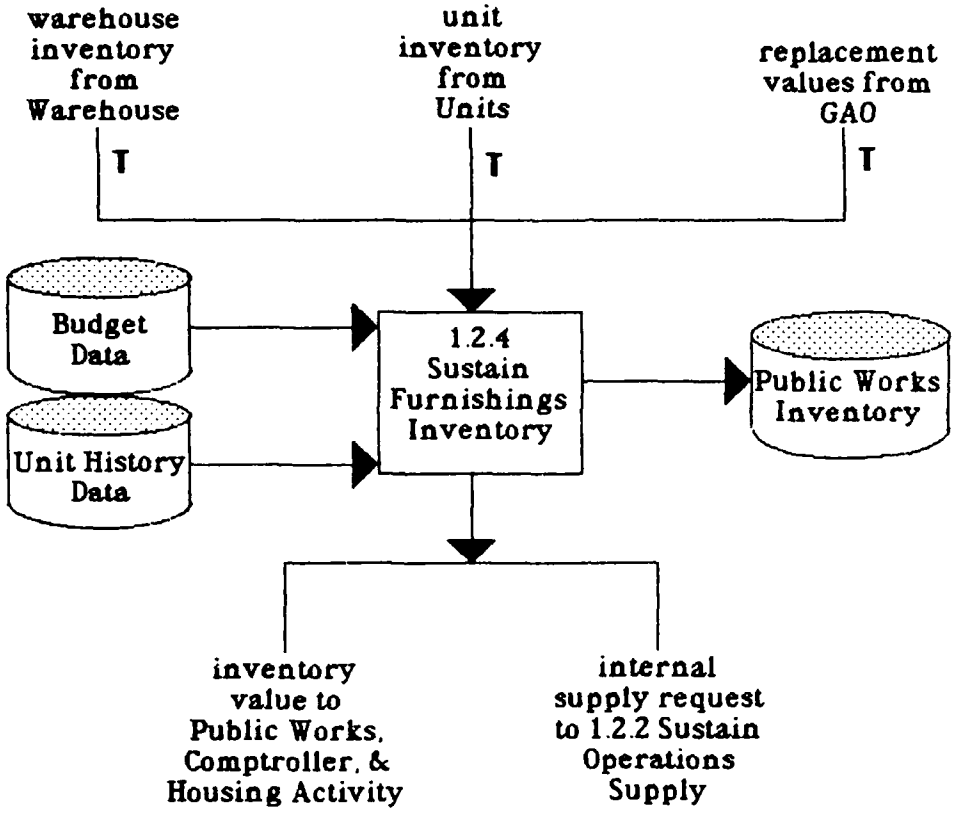


Figure 27
Sustain Furnishings Inventory Data Usage Chart

5. 1.2.3 Conserve Utilities Data Usage Chart

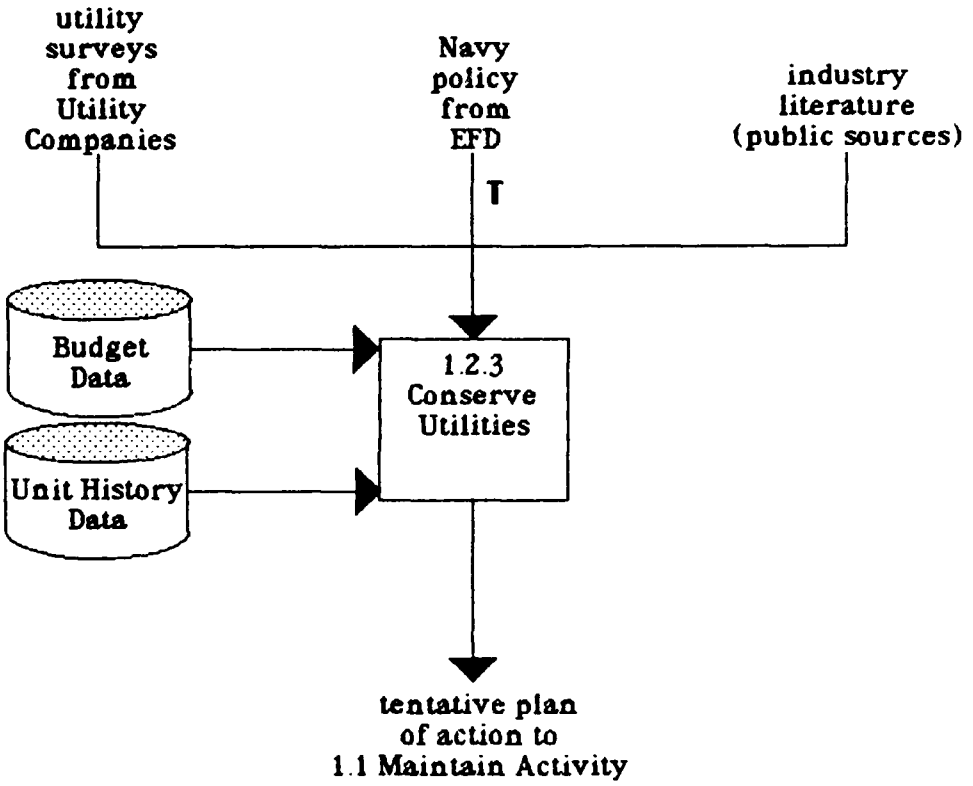


Figure 26
Conserve Utilities Data Usage Chart

4. 1.2.2 Sustain Operations Supplies Data Usage Chart

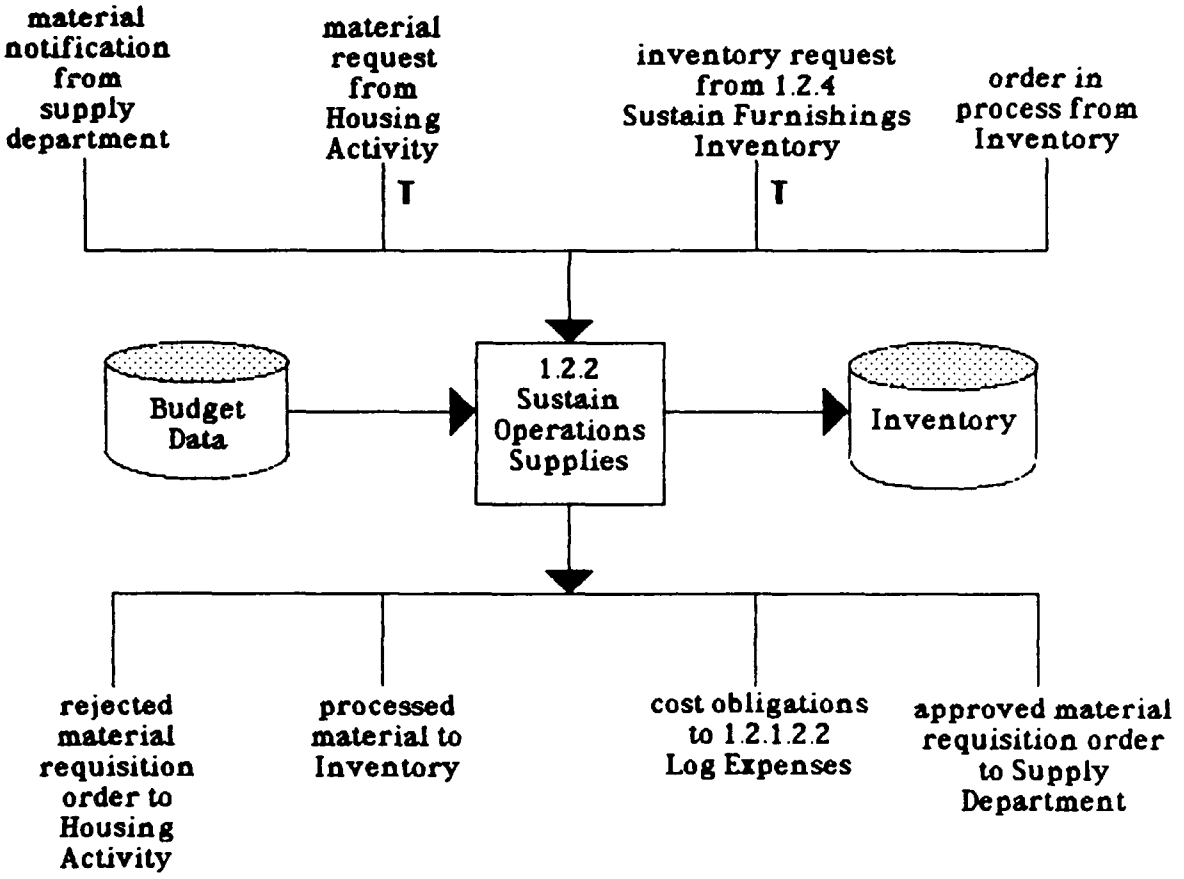


Figure 25
Sustain Operations Supplies Data Usage Chart

3. 1.2.1.2 Execute Budget Data Usage Chart

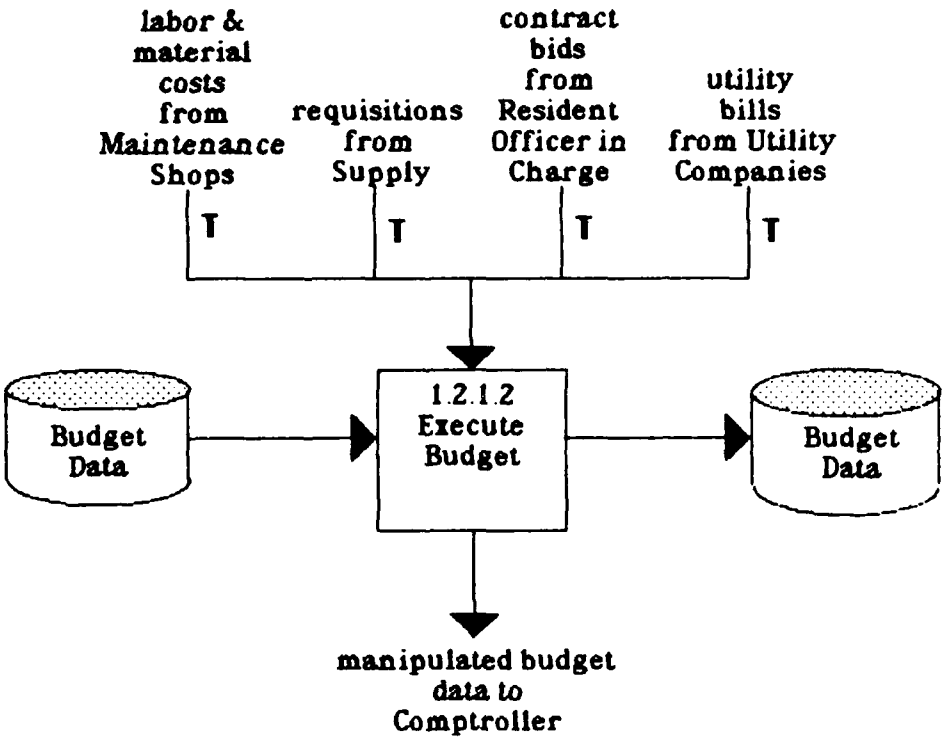


Figure 24
Execute Budget Data Usage Chart

2. 1.2.1.1 Prepare Budget Data Usage Chart

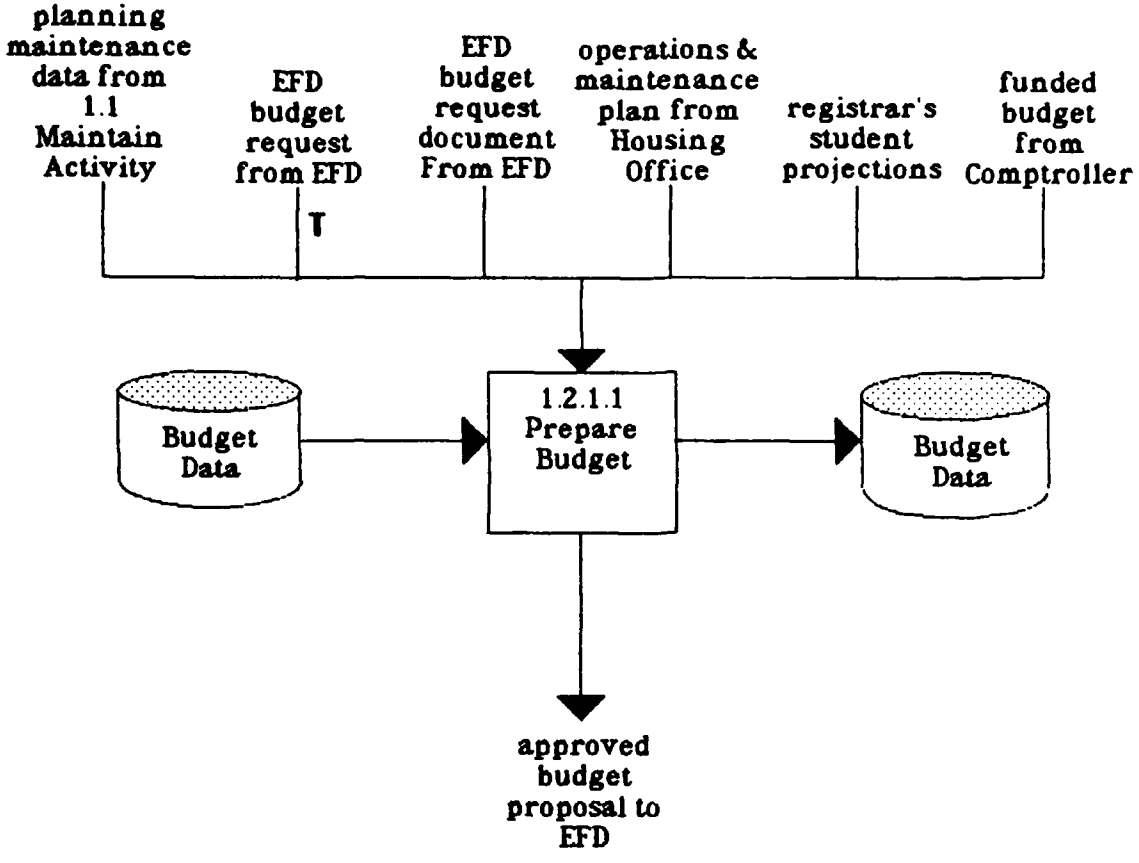


Figure 23
Prepare Budget Data Usage Chart

1. 1.1 Maintain Activity Data Usage Chart

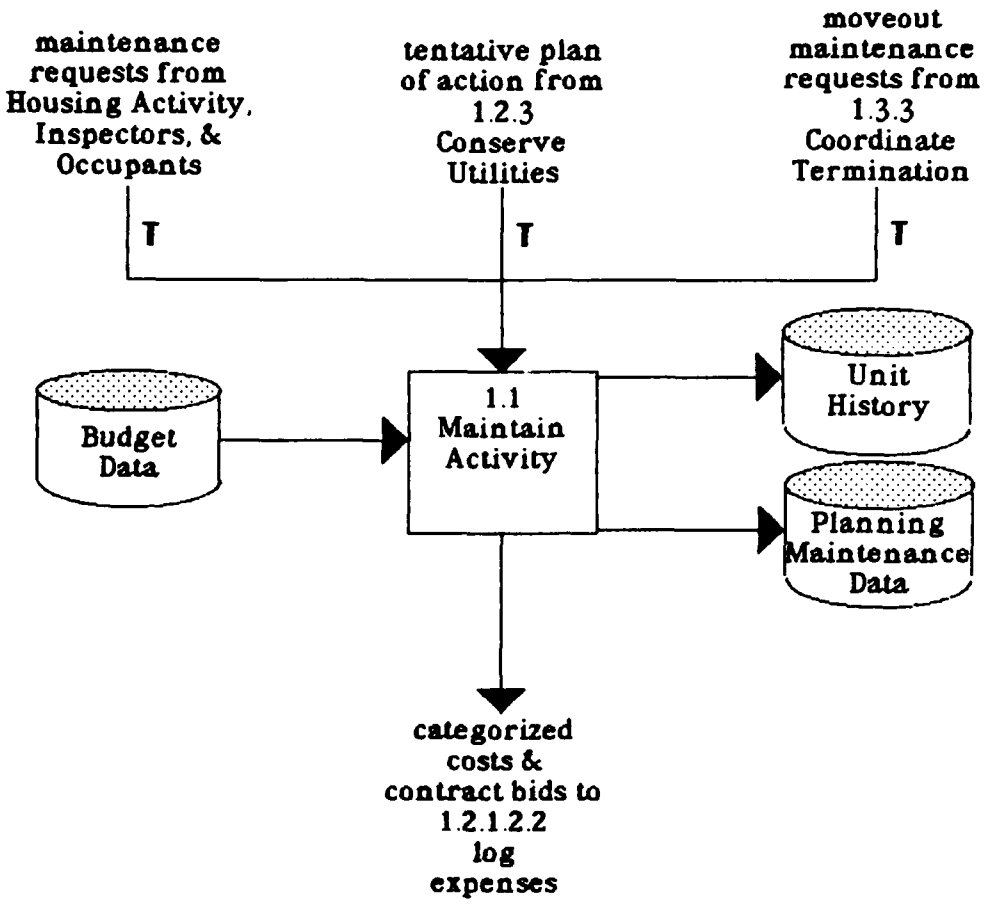


Figure 22
Maintain Activity Data Usage Chart

IV. DATA USAGE ANALYSIS

A. TRANSFORM ANALYSIS

Information that is to be processed by any system or functional part of that system must initially enter from the outside world. All such external information must be converted into some internal form for processing. At the level of detail followed throughout this thesis, it is not important how this information is internalized to that particular function, but what is needed for the function (or transformation) to take place. The level that is refined here is the applicable Data Flow Diagram seen as a "black box", with those information flows needed for its operation.

The following graphical analysis is a refinement of the applicable data flow diagram data inputs, the data stores utilized, and the function's resultant output. The data on the upper line structure is information which the function requires to accomplish its actions. A capitol "T" indicates that information is a trigger of the function. A trigger is some data or requirement that causes the function to occur. The data store on the left of the function block represents that collection of data from which the function must draw to accomplish its actions. The data store on the right of the function represents that collection of data on which the function operates (update, delete, add, etc.). The data on the lower line structure represents the output the function produces.

From Module 1.2.2.2 of Sustain Operations Supply to Supply Department

Any request that cannot be fulfilled through the internal (base) ready supply department or is at a total cost greater than five hundred dollars must be routed through the supply department. The appropriate forms for requisition are completed and submitted to the Supply Department. The Supply Department can authorize use of a Blanket Purchase Agreement or order the items from DOD sources.

From Module 1.2.4.3 of Sustain Furnishings Inventory to Public Works

Because the housing activity is responsible for only a portion of the Property Account of the entire base, it's entire property inventory must be reported to Public Works. While the activity maintains the facilities assigned to it, Public Works Department has ultimate responsibility of all inventoried property items.

From the Comptroller Office to Module 1.2.1.1.5 of Prepare Budget

Upon receipt of the allotted funds from the EFD slated for the housing activity (via a Form 2276) the Comptroller will contact the housing activity budget desk to relay those total amounts, by Budget Project, by Budget line code that was validatd by the EFD and those amounts actually funded.

From Supply Department to Module 1.2.2.3 of Sustain Operations Supplies

After appropriate actions that fulfill the requirements of the supply requisition, the order in process is returned to the budget desk of the housing activity so that that actual costs and other information may be properly recorded for the housing activity records.

From Module 1.1.4 of Maintain Activity to Resident Officer in Charge

This interface involves those areas of maintaining an activity that require work to be contracted because the work is beyond the skill or scope constraints of the base Public Works Department. The housing activity identifies the area and initiates the request. After preliminary studies are conducted, the formal request is sent to the Resident Officer in Charge. Acting as a representative of the Engineering Field Division, this office continues the process of requesting funding for the contract. Bidding for the design and implementation of the requested construction then follows.

From Module 1.2.1.1.4 of Prepare Budget to Engineer Field Division

After all changes to the budget have been finalized, the approved budget request is forwarded to the Engineer Field Division for review and is incorporated into their request for funds. The EFD budget is then submitted to NAVFAC and congressional approval of a Family Housing Maintenance Account, Navy appropriation will be made. These funds are then allotted to the EFD and subsequently to the base activity Comptroller of each of the housing activities under its control.

From Module 1.2.1.2.3 of Execute Budget to Comptroller Office

Periodic reports on funds status are sent to the base comptroller office in order that that office's records can accurately reflect the funds flow of the housing activity. The comptroller office reports this data to the Area Accounting Activity that has ultimate accounting responsibility of all funds. This interface is important as a check on balance of payments made by the activity against its authorized funds.

III. EXTERNAL INTERFACES

Viewing the Housing Office as a subsystem of the entire Navy, it is obvious that there are many interactions between it and the other subsystems. Taken together, these subsystems comprise the entire Navy. Each subsystem has a sphere of authority and is responsible for its actions within this sphere. When it is required to interact with another subsystem, an interface occurs between these two separate subsystems. There will be a flow of information to or from the external subsystem between this interface. The external subsystems, or entities, must be fully identified so that proper information flow can be modelled. The Housing Office, then, is the system of interest for this model and the interfaces that cause information to flow to or from it are discussed below. Each is graphically depicted on the appropriate data flow diagram as a square (the external entity) with a zig-zagged line between it and a circle (a process in that function). In the title of each external interface, the module given relates to the process as described in the appropriate Navy Housing Functions (Chapter I) subheading. A brief explanation of the logical basis of each external interface follows. Internal interfaces will not be discussed.

From the Resident Officer in Charge to Module 1.1.5 of Maintain Activity

After completion of all aspects of bidding and contract negotiation, the awarded contract is then executed. The housing activity then monitors progress of the contractors to ensure timely and proper completion of the work agreed upon.

****
Element name : Balance
Format : numeric
Size : 9
Description : The amount of alloted funds remaining, by budget project.
****
Element name : Budget line code labor
Format : numeric
Size : 7
Description : The cost of labor, by job order number categorized by budget line code.
****
Element name : Fiscal year budget line code request
Format : numeric
Size : 7
Description : The dollar amount requested, by budget line code, for that particular year.
****
Element name : Fiscal year EFD budget line code validation
Format : numeric
Size : 7
Description : The dollar amount allowed by the EFD, by budget line code, for that particular year.
****
Element name : Annual planning figure
Format : numeric
Size : 7
Description : The dollar amount allotted by the EFD, by budget line code, for that particular year.

****
Element name : Cost account code
Format : alphanumeric
Size : 4
Description : This code indicates a particular type of expense subordinate to a budget line code. Its format is a mix of letters and numbers.
****
Element name : Segment number
Format : alphanumeric
Size : 4
Description : This identifies the budget project, the activity and the fiscal year of a budget line code transaction. It is utilized by the comptroller. Its format is as follows. the first letter is for identifying the different base activities, the second letter indicates the budget, and the last two numbers indicate the fiscal year.
****
Element name : Controlled maintenance project
Format : alphanumeric
Size : 5
Description : This is a code assigned to those budget line codes that have jobs exceeding sixteen manhours or five hundred dollars. It is used by the Area Accounting Activity for tracking those higher cost budget line codes. It's format is as follows. The first letter indicates the type of funds, the second letter indicates where the costs originate, and the last three numbers are sequentially assigned for identification purposes.
****
Element name : Committed funds
Format : numeric
Size : 9
Description : The estimated cost of the material or services requisition.
****
Element name : Actual expense
Format : numeric
Size : 9
Description : The actual cost of the material or service.
****
Element name : Difference
Format : numeric
Size : 7
Description : The variance between the Actual and the Committed costs of the material or service requisition.

B. TRANSACTION ANALYSIS

It is important to insure that all areas normally developed in a logical design are incorporated within this study. Transaction analysis is considered by some as a portion of a logical design. It is discussed here purely in theoretical terms for a more complete understanding of the logical design process. No specific reference is made to the La Mesa Housing Activity logical design.

Transaction analysis is another modular design technique that builds on the concept of a transaction, that is, any occurrence of data that triggers an action or sequence of actions. This type of design strategy is suggested by data flow diagrams that "fan out" at one process. An example is the data flow diagram for 1.1, Maintain Activity, process 1.1.1. It is important to contrast transaction analysis to that of transform analysis for complete understanding of the system design process. While both strategies make the transition from the logical to the physical design more straightforward, transform or transaction analysis may or may not be appropriate to a particular design stage. There is always a question as to which level of detail the design should extend. The gray area of this issue starts at this point in logical design.

The transform analysis technique builds on the concept of data transformation. This high level design looks at functions that call on highly processed input data and lower level modules subordinate to this function. It then transforms the data to the appropriate logical output. To make this distinction clearer, below are definitions of transaction and transformation.

Transaction - a signal, event or unit of data that triggers or initiates some action or sequence of actions [Ref.1].

Transformation - to change information in structure or composition without altering the meaning or value, or normalize, edit, or substitute [Ref.2].

These definitions imply a fundamental difference in the action taken. Transactions are triggers that are singular units, measurable, and cause processes to occur. A transform, however, is more concerned with the overall processing that occurs, not the detailed measurements or elemental composition of the input or output. Below are definitions of transaction analysis and transform analysis.

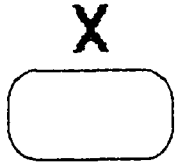
Transaction Analysis - a modular design strategy based on an analysis of the sources, types and actions of transactions in a system [Ref.3].

Transform Analysis - a modular design strategy in which program or system structure is derived from an identification of the input, output, and transformations required to transform inputs into outputs; analysis of data flow and transformation [Ref.4].

It should be clear that the major difference is the level of detail. It is this author's opinion that transform analysis is required for logical mapping of a function as part of a system logical design. Transaction analysis, then, becomes the first step of the detailed design phase of a system life cycle. While there is a definite distinction between these two types of analysis, it is important to realize they are parallel techniques which derive different information from the same sources.

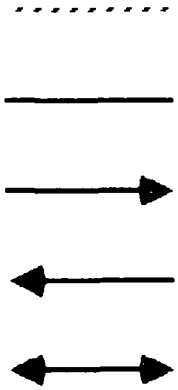
V. DATA RELATIONSHIPS

The following series of eight charts are representative of each function's use or need of a data entity in order to perform the prescribed actions. This straightforward analysis clearly shows relationships between entities within the context of the function. The following symbology is used.



X — Signifies the entity is not needed by that function.

An entity with the appropriate name within.



Signifies no relation exists in that function.

Signifies a one to one relation exists.

Signifies a one to many relation exists.

Signifies a many to one relation exists.

Signifies a many to many relation exists.

No line between entities signifies no relation exists at any time between two entities, regardless of the function being performed. Each solid line is numbered; each instance of that relation is noted on the chart.

A. 1.1 MAINTAIN ACTIVITY DATA RELATIONSHIP CHART

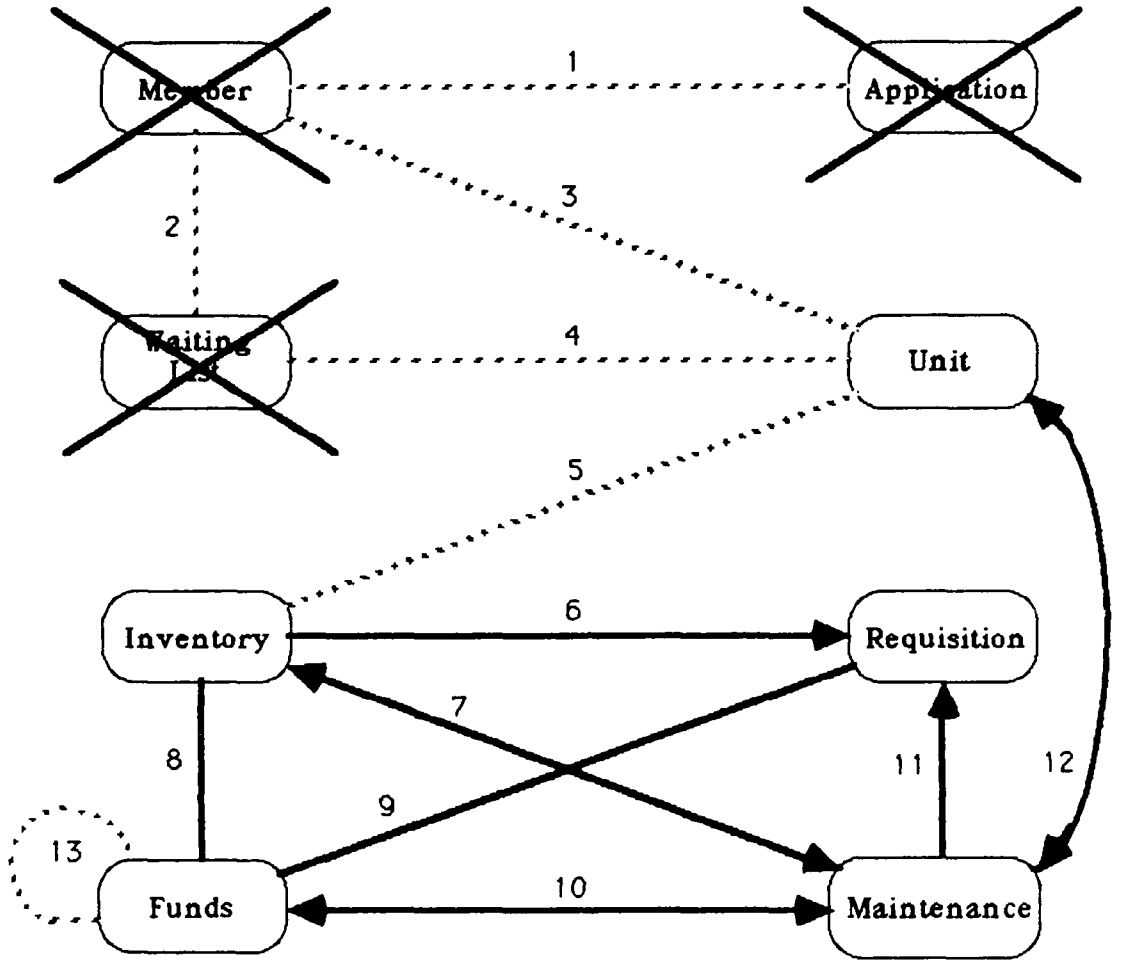


Figure 30
Maintain Activity Data Relationship Chart

The following relates to the preceeding figure, Figure 30, Maintain Activity.

6) Requisitions are generated for Inventory item restocking.

7) Inventory items require maintenance to keep them in working order.

Inventory items are used in order to complete maintenance action needs.

8) Inventory item utilization is recorded with the Funds data.

9) Requisitions are charged against specific Funds.

10) Funds pay for all Maintenance.

Maintenance is categorized by the funds it uses.

Initial estimates of maintenance are made based on historical Funds data.

Maintenance department estimates are approved or rejected based on Funds available.

11) If material is needed that is not available in Inventory, Requisition is used for procurement.

12) Units have many types of maintenance required to keep them habitable.

Maintenance categories are performed on units.

B. 1.2.1.1 PREPARE BUDGET DATA RELATIONSHIP CHART

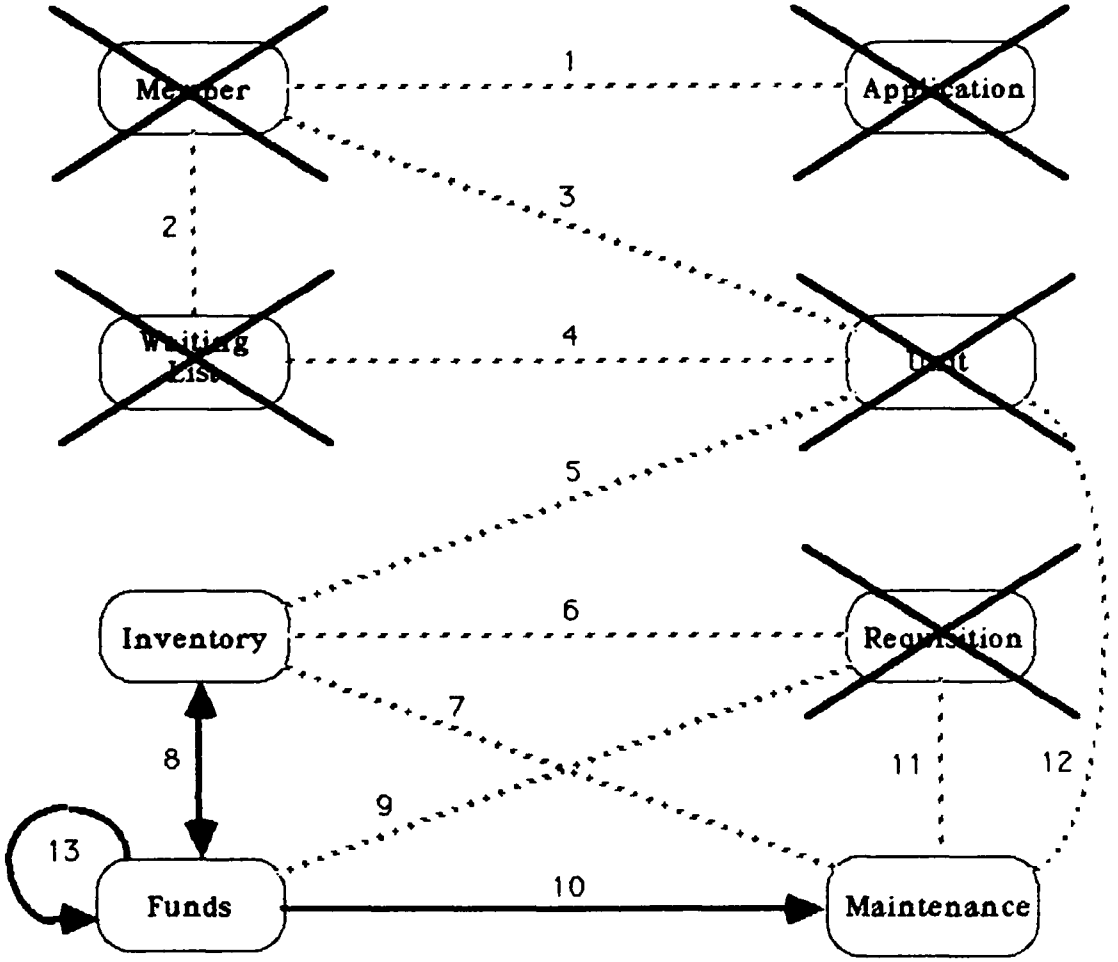


Figure 31
Prepare Budget Data Relationship Chart

The following relate to the preceding figure, Figure 31, Prepare Budget.

8) Replacement value of inventory items are needed for budget preparation.

   Projected inventory shortfalls to meet future needs are needed.

10) Planned maintenance is utilized to project future needs to maintain the activity at acceptable standards.

    Maintenance uses Funds to prioritize future requirements.

    Maintenance uses Funds to validate what is expected versus how much is budgeted for the service.

13) Funds are hierarchical. A total budget is made up of budget projects, which are made up of budget line codes, which are further made up of cost account codes. These portions are associative in order to prepare a budget.

C. 1.2.1.2 EXECUTE BUDGET DATA RELATIONSHIP CHART

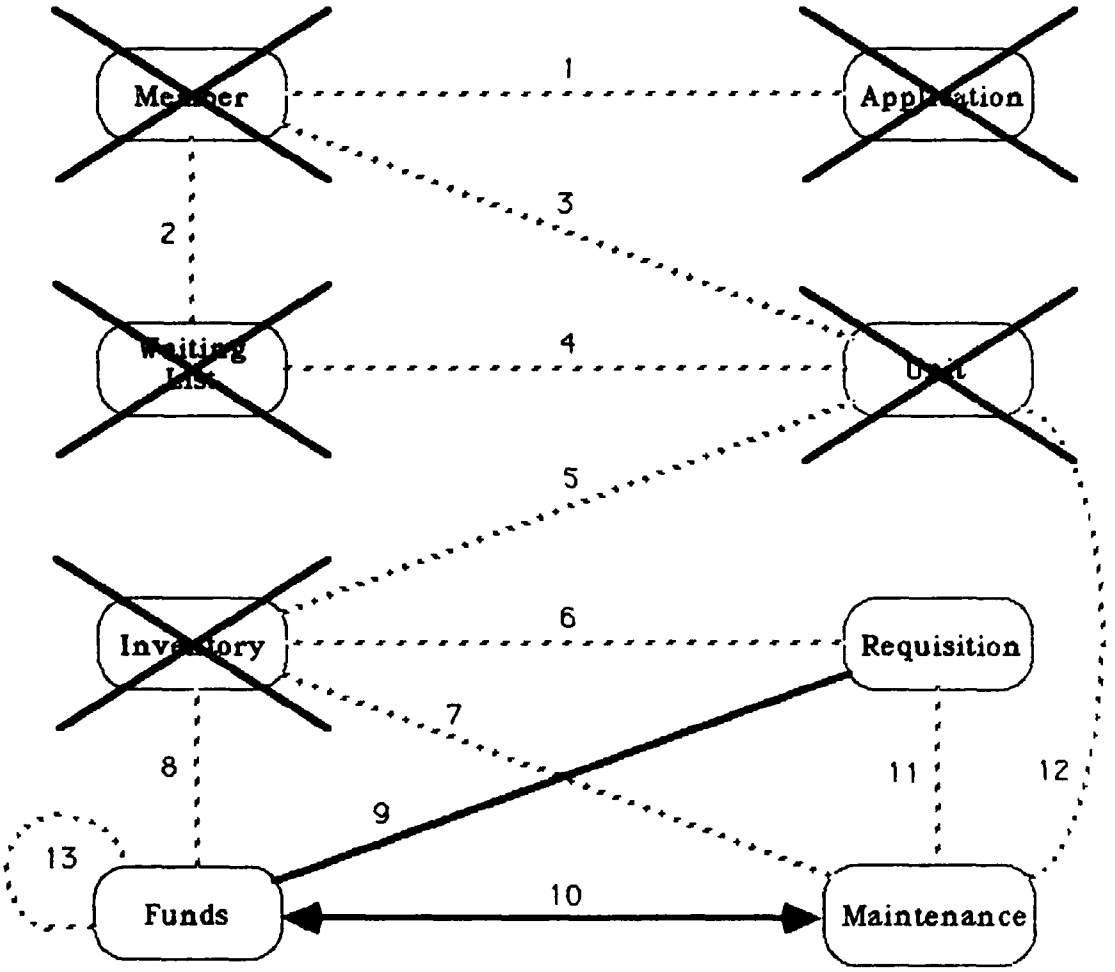


Figure 32
Execute Budget Data Relationship Chart

9) Requisitions are paid for by Funds.

10) Maintenance is paid for by Funds.

D. 1.2.2 SUSTAIN OPERATIONS SUPPLIES DATA RELATIONSHIP CHART

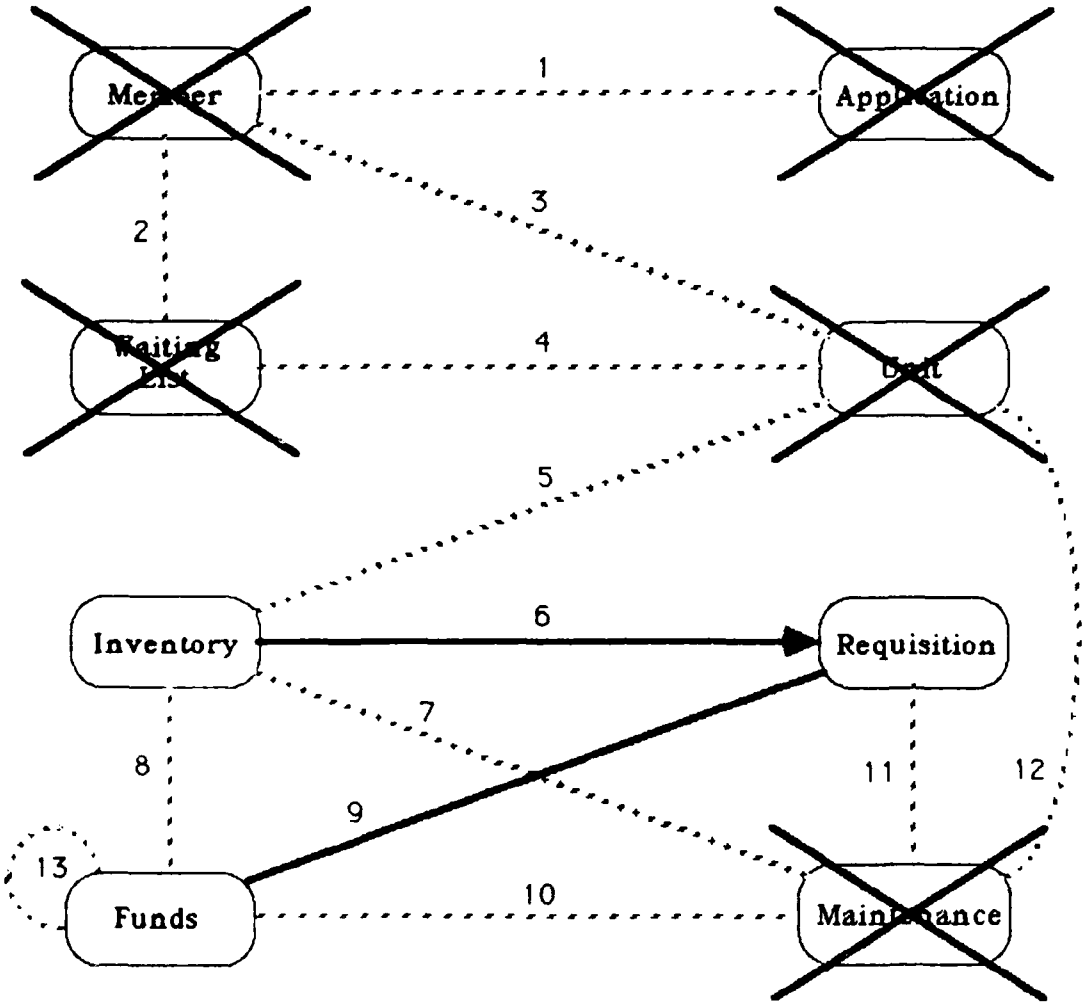


Figure 33
Sustain Operations Supplies Data Relationship Chart

6) Requisitions order inventory items.

9) Requisitions are paid for by Funds.

E. 1.2.3 CONSERVE UTILITIES DATA RELATIONSHIP CHART

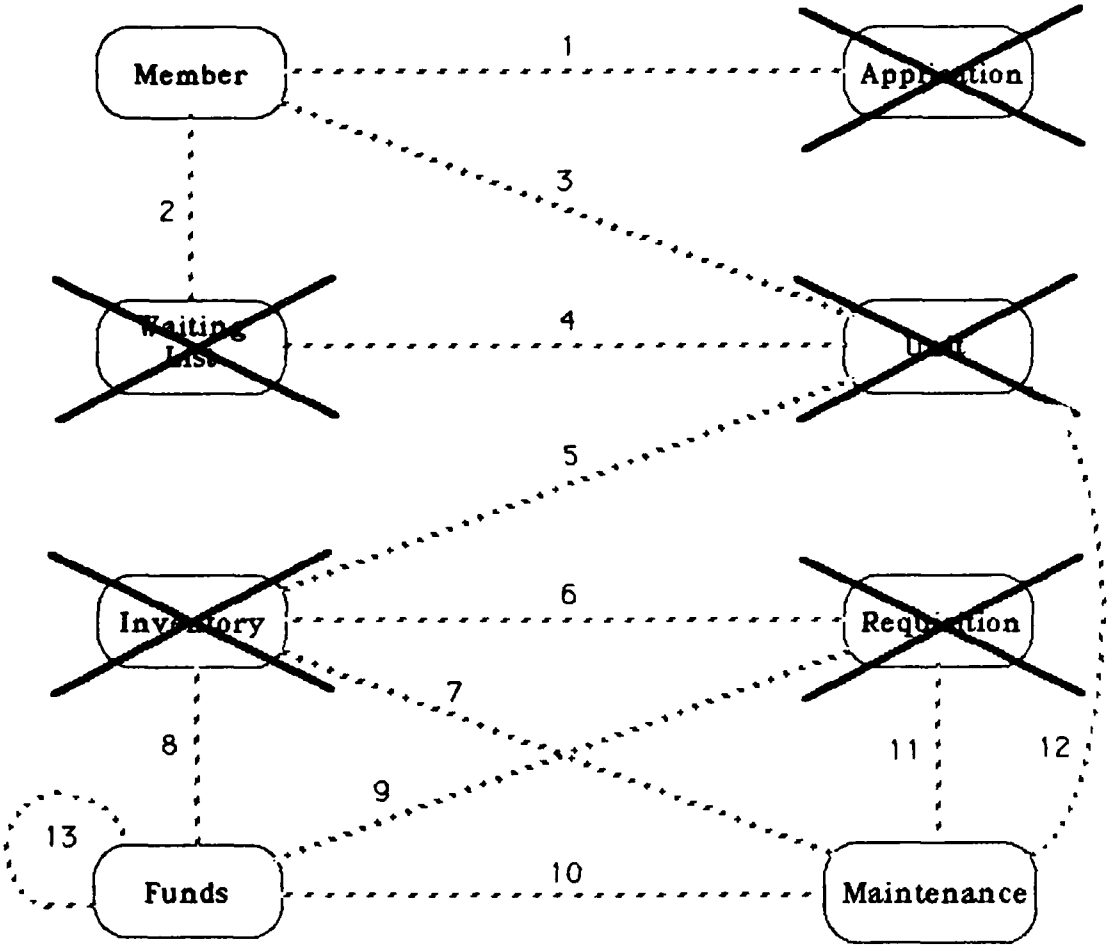


Figure 34
Conserve Utilities Data Relationship Chart

There are no relationships between entities in this function.

F. 1.2.4 SUSTAIN FURNISHINGS INVENTORY DATA RELATIONSHIP CHART

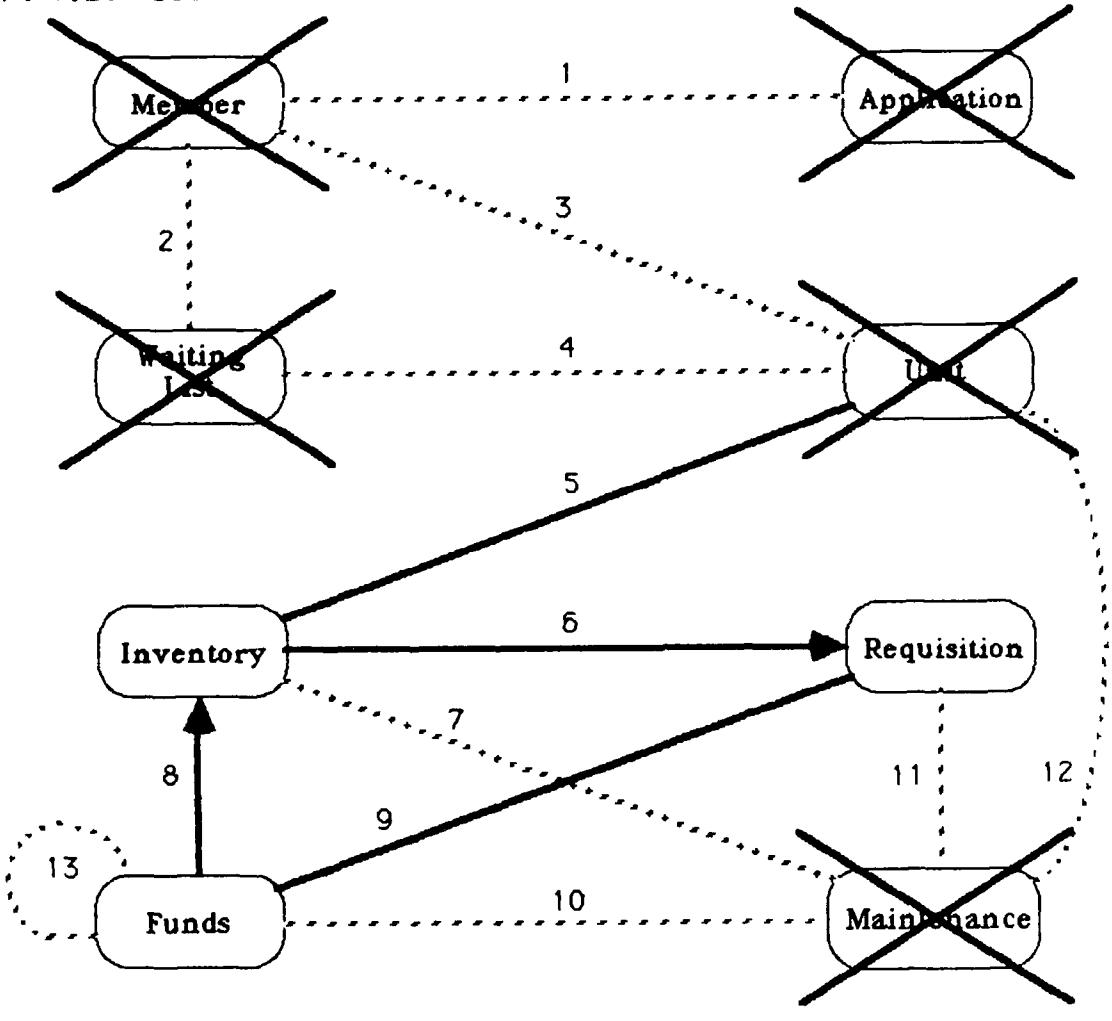


Figure 35
Sustain Furnishings Inventory Data Relationship Chart

5) For any Unit there is a set of Inventory items assigned to it.

6) Inventory requires Requisition to purchase stock to maintain adequate numbers of items.

8) Inventory items are categorized by Funds.

9) Requisitions are paid for by Funds.

G. 1.3.1 COORDINATE ASSIGNMENT DATA RELATIONSHIP CHART

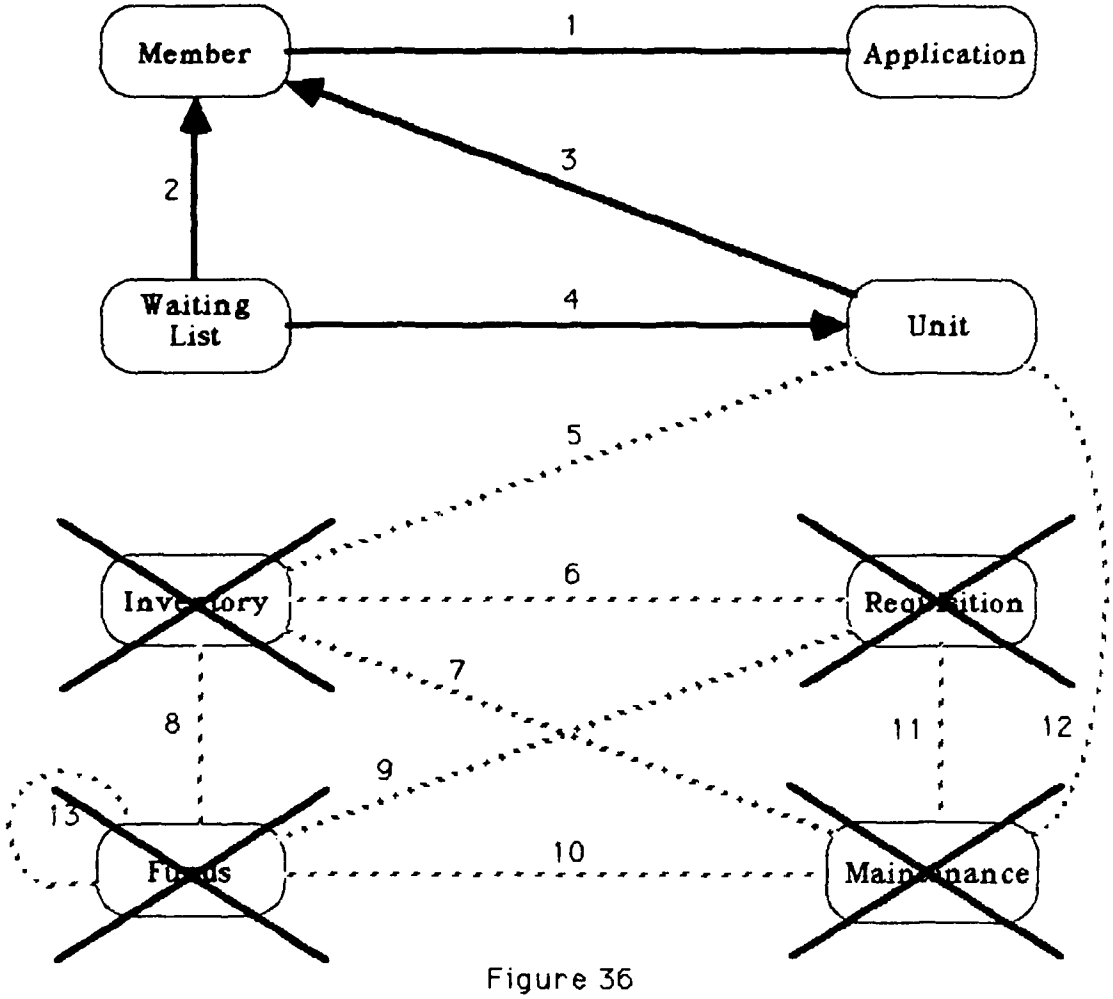


Figure 36
Coordinate Assignment Data Relationship Chart

1) A Member must fill out and submit an Application.

2) A Member is assigned to a waiting list.

3) A Member is assigned to a Unit.

A Unit has past Members associated to it for historical purposes.

4) A waiting list is applicable to a set of units, categorized by the waiting list criteria.

H. 1.3.3 COORDINATE TERMINATION DATA RELATIONSHIP CHART

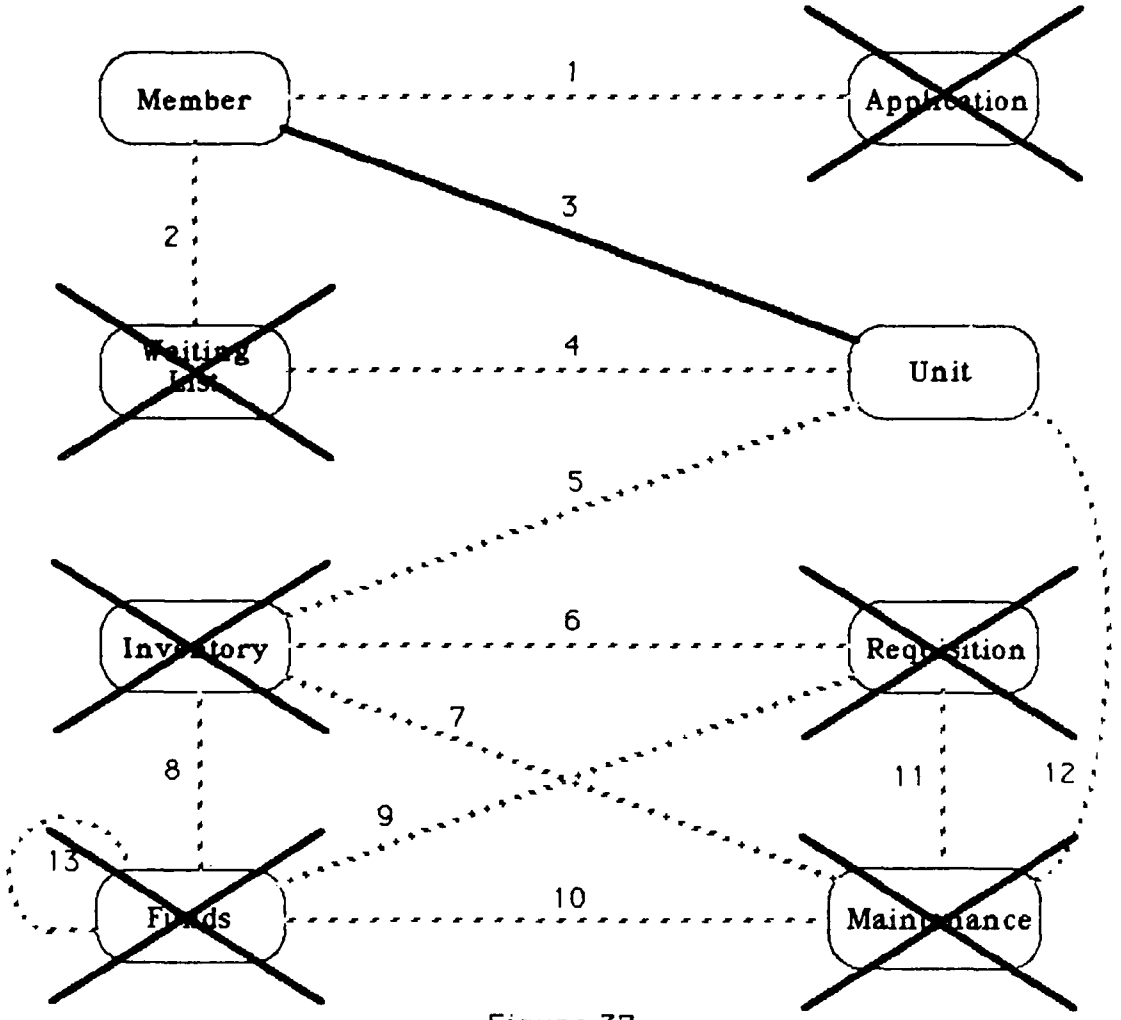


Figure 37
Coordinate Termination Data Relationship Chart

3) A Member is responsible for the physical unit prior to termination.

A Member and Unit are separated at termination.

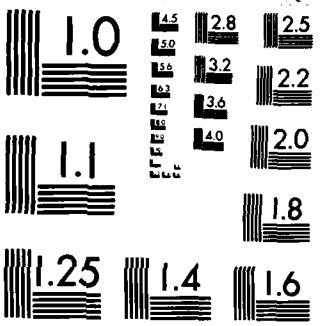
VI. CONCLUSIONS

The La Mesa Housing Project received a Wang Office Information System model 60 (OIS-60) in July of 1984. This system is a sophisticated word processor with advanced text editing features. Additionally, the optional list processing software was purchased and allows for list (record) processing of user defined files. This information processor is now being extensively used in the daily working of the office, and has assimilated virtually all of the office word processing needs. Many inventory and list applications such as the waiting list and the maintenance history files are also now being implemented on the OIS-60. However, no capability exists within this system for automatic update capabilities to the other files or records that are, or will be, affected by changing information. Manual collation of information is required; redundant information therefore follows. While being used to its fullest capabilities, inherent design constraints restrict the OIS-60 from being the true automation answer to the activity's needs.

Many of the information needs of the various processes cross the fundamental functional boundaries of Maintain Activity, Operate Activity, and Handle Occupant Relations. The critical area of information is Maintain Budget (1.2.1) of the Operate Activity function. Virtually all operations and maintenance activities revolve around the data processing of this closely watched and dynamic area. Internal interfaces exist between Budget Execution (1.2.1.2) and Maintain Activity (1.1) as well as Sustain Operations Supplies

AD-A155 162 A LOGICAL DESIGN OF THE NAVAL POSTGRADUATE SCHOOL HOUSING OFFICE(U) NAVAL POSTGRADUATE SCHOOL MONTEREY CA A W CALDER MAR 85 2/2

UNCLASSIFIED F/G 5/1 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

(1.2.2). Budget data is required by all functions except those under Handle Occupant Relations (1.3). The Funds entity that is integral to Maintain Budget (1.2.1), is in some relationship in all functions except those in Handle Occupant Needs (1.3). Further, the Funds entity is a recursive entity in the budget execution function. It is also the most volatile entity, yet is not automated in any way. It is the one function around which all others (except coordinate assignment and termination) pivot. Past performance reports, day to day operations, and predictions on future needs require information on monetary status. In fact, maintenance history is categorized by budget line code. Redundant records are kept at this time to fulfill both budget requirements and historical information on the activity. While present automation capabilities are appropriate and being utilized fully, they overlook the one area that is most central to activity operation. Budget data are maintained by standard double entry bookkeeping procedures and are amenable to automation using off-the-shelf application software specifically designed for this purpose. While the Wang OIS-60 can run CP/M application programs that could satisfy this application, it cannot be extended to a database application that could eliminate redundancy of information.

The implementation of a stand alone system that integrates budget execution procedures with the many reports and historical files of past actions would greatly enhance accuracy and timeliness of information that must be utilized in all aspects of the execution of the Housing Activity duties. The La Mesa Housing Office has a viable manual system that is highly organized and workable, but it is a function of the people administering the system, not

the system itself. It is important, however, that this separate system with dedicated hardware and software be able to network with the OIS-60 in order to use its many features (word processing, list processing).

The information system requirements cut across all three functional areas of data processing use. Transaction processing is needed to maintain timely and correct budget information in a dynamic environment. This information, in turn, drives the short and long term decisions for maintenance management. Information on funds, occupancy, and maintenance drive future decisions of these same functions. But a need exists to maintain the budget and integrate the myriad expenses into the appropriate categories of information for these three areas of an information system. The WANG OIS-60 now in place is not central to the real needs, but adjunct to them.

The recommendation of this study is to model the Maintain Budget (1.2) function at a detailed design level, documenting the report needs of the information that is used. This is the central area of the activity, and should be examined further in an effort to design a system which provides the necessary requirements.

LIST OF REFERENCES

1. Weinberg, V., Structured Analysis, p. 320, Prentice-Hall, 1978.

2. Meek, C. L., Meek's Glossary of Computing Technology, CCM Information Corporation, p.240, 1972.

3. Weinberg, V., Structured Analysis, Prentice-Hall, p. 320, 1978.

4. Ibid,p. 320.

BIBLIOGRAPHY

Huffman, L., Primer, J., and Resuta, T., Systems Study Report : La Mesa Housing Project, paper submitted as final project for IS 3183, Management Information Systems, Naval Postgraduate School, 1984.

Navy Family Housing Manual, NAVFAC P-930, Department if the Navy Naval Facilities Engineering Command, September 1980.

Powers, M. J., Adams D. R., and Mills, H. D., Computer Information Systems Development : Analysis and Design, South-Western, 1984.

Pressman, R. S., Software Engineering : A Practitioner's Approach, McGraw-Hill, 1982.

Weinberg, V., Structured Analysis, Prentice-Hall, 1978.

Yourdon, E., Managing the Structured Technique, Prentice-Hall, 1978.

INITIAL DISTRIBUTION LIST

		No. Copies
1.	Defense Technical Information Center Cameron Station, Alexandria, Virginia 22314	2
2.	Library Code 0142 Naval Postgraduate School Monterey, California 93943	2
3.	Lt. Barry A. Frew Code 54 Fw Administrative Services Department Naval Postgraduate School Monterey, California 93943	2
3.	Professor Dan Dolk Code 54 Dk Administrative Services Department Naval Postgraduate School Monterey, California 93943	1
4.	Lt. Alexander W. Calder VQ-3 NAS Barbers Point, Hawaii 96862	4
5.	Greg Murphy La Mesa Housing Office 1101 Farragut Road Monterey, California 93940	1
6.	Mr. Robert Sykes 200 Stovall Street Alexandria, Virginia 22332	1
7.	LCDR Matthew L. Lechleitner Math/Sciences Department U. S. Naval Academy Annapolis, Maryland 21402	1
8.	Computer Technology Programs Code 37 NPS Monterey, California 93943	1

END

FILMED

7-85

DTIC